



THE KING OF SWEDEN SIGNING THE ROLL.

SIR F. HARMER.

DR. E. J. SALISBURY.

DR. W. T. CALMAN.

DR. A. B. RENDLE, P.L.S.

SIR A. S. WOODWARD.

DR. B. DAYDON JACKSON.

H.M. THE KING OF SWEDEN.

PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.



136TH SESSION.

FROM NOVEMBER 1923 TO JUNE 1924.

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CONTENTS.



	Page
List of Publications issued	iv
Proceedings of the 136th Session	i
Presidential Address	35
Obituaries	45
Abstract	69
Explanation of the Plates	70
Benefactions, 1904-1923	71
Additions to the Library	75
Index	80

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PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND THIRTY-SIXTH SESSION,
1923-1924.)

November 1st, 1923.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 21st June, 1923,
were read and confirmed.

Miss Joan Beauchamp Procter was admitted a Fellow.

Miss Dorothy Jean Jackson, James MacDonald, Edward Battiscombe, Hiralli Chennaya Javaraya, Joseph Francis d'Almeida, B.A., B.Sc., Christopher Carl Hentschel, B.Sc., and Herbert Edward Forrest, were proposed as Fellows.

The following were proposed as Associates: James Alfred Wheldon, Hon. M.Sc. (Liverp.), and Alfred Santer Kennard.

The PRESIDENT announced that a ballot for Fellows and Associates would be taken on the 13th December, and that a vacancy in the list of Associates had been caused by the death of Mr. William Barclay.

He also read a letter from Mr. T. F. Cheeseman, F.L.S., thanking the Society for the award of the Linnean Medal at the last Anniversary, which he had received through the hands of Sir James Allen, K.C.B., High Commissioner of New Zealand.

Mr. SYDNEY GARSIDE, M.Sc., read a paper on the forms of *Hypoxis stellata*, Linn. f., a South African species of Amaryllidaceæ.

The paper dealt with the results of a field and laboratory study of the varieties of *Hypoxis stellata*, Linn. f. (*Ianthe stellata*, Williamson) and was illustrated by lantern-slides and plates. Four varieties are distinguished, one of these as yet undescribed. In each case the varieties have constant vegetative characters, but the flowers show a considerable range of colour varieties of a "continuous" kind.

Important cytological characters of the upper epidermis of the perianth lobes were described, with particular reference to the remarkable iridescent areas which occur in some varieties.

The characters of the four varieties were briefly outlined, and the view was expressed that these are not distinct species, as some of the earlier botanists supposed. Support for this view is based upon the structure of the ovary; breeding experiments have not yet been made. Habitat may considerably influence the size of the plant, but the varietal characters remain constant.

In conclusion, the need for more field work upon difficult genera of S. African monocotyledons was emphasized.

A discussion opened by the President was continued by Mr. N. S. Pillans (visitor), Mr. H. N. Ridley, F.R.S., and Dr. H. A. Baylis (visitor), the author replying, and stating in answer to a question, that the seeds are spherical when ripe, about the size of a mustard-seed and fitted for dispersion by water.

Dr. H. A. BAYLIS read a paper on "The host-distribution of Parasitic Thread-worms (Nematodes)," which was communicated by the Zoological Secretary.

Mr. R. Daubney, M.Sc., of the Ministry of Agriculture (visitor) expressed himself in agreement with the conclusions drawn.

The third paper was entitled: "On the cuticular structure of the Devonian plant *Psilophyton*," by Mr. W. N. EDWARDS. (Communicated by Mr. J. Ramsbottom, O.B.E., M.A., Sec. L.S.)

Dr. D. H. Scott, F.R.S., and the President having contributed further remarks, the author briefly replied.

Dr. G. CLARIDGE DRUCE exhibited specimens of *Carex microglochin*, Wahlenb., recently discovered as a native of Britain. It had been found by Lady Davy and Miss Gertrude Bacon in Coire nam Buidheag (Yellow Corrie) on Meal Garbh at 2,500 feet, in July last, and a month later confirmed by Dr. Druce with a special visit to Glen Lyon: it was seen growing in shallow micaeous bogs; *Carex pauciflora* grows plentifully in the neighbourhood, and may have hitherto prevented the recognition of the newly-discovered species by its superficial resemblance.

A sheet of specimens gathered by Mr. C. E. Salmon in Glen Lyon some years ago was adduced in proof of this.

Mr. James Groves adverted to the wide distribution of *Carex microglochin*, and the discussion was continued by Mr. T. A. Dymes, Mr. A. J. Wilmott, and the President.

November 3rd, 1923.

ROYAL VISIT.

His Majesty the KING OF SWEDEN honoured the Society by a visit in the forenoon of Saturday, November 3rd, 1923, accompanied by His Excellency Baron PALMSTIERNA, the Swedish Minister, the King's suite, and Sir CHARLES CUST, Bt., G.C.V.O.

His Majesty was received by Dr. A. B. RENDLE, F.R.S., President, Mr. HORACE W. MONCKTON, Treasurer, Dr. W. T. CALMAN, F.R.S., and Mr. JOHN RAMSBOTTOM, O.B.E., M.A., Secretaries, Dr. B. DAYDON JACKSON, R.N.O., Hon. Ph.D. (Upsal.), General Secretary, Sir SIDNEY HARMER, K.B.E., F.R.S., Dr. A. SMITH WOODWARD, F.R.S., Dr. E. J. SALISBURY, and Mr. LESTER-GARLAND, M.A., Members of the Council, with the Staff of the Society.

His Majesty inspected the collections of Linnæus, comprising the herbarium, insects, shells (including the artificial pearls produced by Linnæus), fishes' skins affixed to sheets of paper; the letters received and preserved by the recipient, and the interleaved and copiously annotated volumes, such as the 'Species Plantarum' and 'Fauna Suecica.'

In the library the original diary kept by Linnæus in his adventurous Lapland journey in 1732 was displayed, with the printed editions by Sir J. E. Smith, Dr. E. Ährling, and Professor Thore Fries, the last carefully adhering to the original spelling.

The portraits and busts of the great Swedish naturalist decorating the library were explained, medals struck by the Swedes and the Linnean Society were examined, and other objects of interest such as the Rudbeck blocks for the "Campus Elysius" were shown.

His Majesty having graciously accepted the recently-published volume, 'Linnæus,' by Dr. Jackson, and other volumes dedicated to advancing the knowledge of the life-work of the Upsala professor, quitted the apartments of the Society after a lengthy stay, during which he signed the Roll and Charter Book on the emblazoned page of vellum specially provided.

This incident is shown in the frontispiece from a photograph taken by the Photopress, Johnson's Court, Fleet Street.

November 15th, 1923.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 1st November, 1923, were read and confirmed.

Mrs. Nora Lilian Alcock and Prof. Alfred James Ewart were admitted Fellows.

Certificates in favour of Miss Dorothy Jean Jackson, James MacDonald, Edward Battiscombe, Hiralli Chennaya Javaraya, Joseph Francis d'Almeida, B.A., B.Sc., Christopher Carl Hentschel, B.Sc., and Herbert Edward Forrest, as Fellows, and James Alfred Wheldon, Hon. M.Sc. (Liverp.), and Alfred Santer Kennard, as Associates, were read for the second time.

Cecil Norman and Gavin Rylands de Beer, B.A., B.Sc., were proposed as Fellows.

The PRESIDENT described the visit of the King of Sweden to the Society's rooms on Saturday, November 3, and exhibited lantern-slides of two groups, one of which showed His Majesty in the act of signing our Roll and Charter-book.

The first paper was by Dr. E. J. SALISBURY, on "The relation of Earthworms to Soil Reaction."

Mr. R. J. Tabor, Prof. A. J. Ewart (who commented on the fact that the giant earthworms of Victoria, Australia, were being dispossessed by the far smaller introduced species, probably on account of the changes induced in the soil by the latter proving unfavourable to the giant worm), and Dr. W. T. Calman spoke on the paper, the author replying.

"The Flora of Solomon's Pools" was the title of Miss E. M. BLACKWELL's paper, abstracted as follows:—

Solomon's Pools lie about six miles south of Jerusalem, 2,616 feet above sea-level in a valley, Wady Artâs, which runs east and west below low hills of red-brown ferruginous earth through which limestone bosses project. The pools, three in number, are obviously artificial, and are in fact large open cisterns or reservoirs. The high walls of the pools, at first cut in the hard rock, have been lined at some time with a mortar made of lime and broken red earthenware. On some sides the walls are sheer and precipitous, on others they are terraced, thus affording a platform at various levels. Surface water drains from the hill-

sides, and there are five good sources of water immediately about the pools. The Civil Administration which came into office after the occupation of Jerusalem by the British Forces (1917-1918) is thoroughly overhauling the system. The middle and lowest pools have been cleaned and partially repaired, and pumping plants erected.

In July, 1923, the uppermost pool had already dried up. As the water is constantly evaporating in the hot summer, it is not surprising that analysis shows a high percentage of dissolved solids.

The clear water of the lowest and middle pools supported a luxuriant growth of *Chara* spp., *C. connivens* in the lowest and *C. contraria* and *C. fragilis* in the middle pool, forming almost a pure society. In the middle pool there was in addition an aquatic grass growing freely, and a few filamentous algæ, desmids and diatoms. In the lowest, however, *Potamogeton flabellatus* var. *scoparius* was flowering and fruiting with equal vigour, almost rivalling the *Chara* for dominance. At the deeper end of the lower pool were tufts of *Riella helicophylla*, their spirally coiled thalli floating out into the water in loose rosettes at a considerable depth. Where the floor of the west side of the lowest pool was exposed on account of the slope, the drying mud was covered with a thick carpet of bleached plants of *Chara*, and growing up through it *Typha latifolia*, *Scirpus maritimus*, *Heleocharis palustris* and *Euphorbia aleppica*. The flora reminds one of the "slacks" in the Lancashire sand-dunes, having *Chara contraria*, *Typha*, *Scirpus* and *Heleocharis* in common. The waters in both cases are calcareous, with a high percentage of dissolved solids, especially chlorides and carbonates.

The President, Mr. H. N. Ridley, Dr. J. P. Lotsy (visitor), Prof. F. E. Weiss, Prof. F. E. Fritch, and Dr. W. T. Calman engaged in a discussion, the author briefly replying.

The last paper was by Mr. R. E. CHAPMAN, on "The Carbohydrate Enzymes of certain Monocotyledons."

He remarked that if the theory of enzyme action is correct that they are to take part in both hydrolysis and synthesis, an investigation into the enzymes present in the green leaves of certain plants may afford an explanation of why they never form starch. The material used was the green foliage leaves of the snowdrop (*Galanthus nivalis*), the onion (*Allium Cepa*), and the leek (*A. Porrum*), with a starch-forming plant, a common dock (probably *Rumex obtusifolius*) for purposes of comparison. The leaves were air-dried, powdered and added to dilute solutions of starch, dextrine, maltose, cane sugar, and amygdalin, using qualitative tests and changes in the rotation of polarized light for the detection of hydrolysis. Toluol was used as antiseptic and the solutions incubated at 39° C. The results indicated that of the five carbohydrate enzymes—amylase, dextrinase, maltase, invertase and

emulsin—maltase and emulsin were absent from the snowdrop, dextrinase from the onion, amylase from the leek, but all five were present in the dock. The formation of starch in the parenchyma cells of the three Monocotyledons is thus prevented, because the necessary set of enzymes is incomplete.

In certain cases (e.g., *Galanthus* and *Narcissus*), although the parenchyma cells of the adult leaf have no starch, it is always present in the guard-cells, and prolonged starvation in darkness does not cause the disappearance of this starch. (The young leaf may have starch outside the guard-cells.) It was suggested that in the snowdrop the adult leaf has starch in the guard-cells together with diastase but not maltase, so that hydrolysis can proceed only to maltose, and the system, $\text{STARCH} \xrightleftharpoons{\text{diastase}} \text{MALTOSE}$ catalysed by diastase, may be part of the mechanism for regulating the amount of solid or soluble matter inside the guard-cells, thus controlling the opening or closing of the stomata.

Prof. A. J. Ewart, Mr. E. J. Collins, Dr. R. R. Gates, Lieut.-Col. J. H. Tull Walsh, and the President discussed the paper, and the author replied.

November 29th, 1923.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 15th November, 1923, were read and confirmed.

Mr. Charles Carmichael Arthur Monro, B.A. (Oxon.), Miss Margery Knight, M.Sc. (Liverp.), and Prof. Walter Theodore Saxton, M.A. (Cantab.), were admitted Fellows.

Certificates in favour of Cecil Norman and Gavin Rylands de Beer, M.A., B.Sc., were read for the second time.

Cecil Henry Hooper and Alan Sterling Parkes, B.A. (Cantab.), Ph.D. (Manch.), were proposed as Fellows.

Mr. C. C. LACAITA read his paper on "The Onosmas of Linnæus and Sibthorp, with a note on those of Tournefort's herbarium."

The President, Mr. A. J. Wilmott, Mr. T. A. Dymes, and Mr. H. R. Darlington engaged in the discussion which followed, the author replying.

The second paper, "On new species of Permian Osmundaceæ," by Dr. M. D. ZALESKY, communicated by Prof. A. C. Seward, F.R.S., was summarised by Dr. D. H. Scott, F.R.S.

Dr. E. Drabble contributed a few remarks on the subject of the paper.

The last paper was by Dr. C. L. WITHERCOMBE, now of Trinidad, communicated and read by Mr. John Ramsbottom, O.B.E., Botanical Secretary, entitled "On the function of the bladders in *Utricularia vulgaris* Linn."

The discussion was continued by Prof. A. J. Ewart, Mr. A. J. Wilmott, Mr. S. Garside, and Mr. H. J. H. Russell, Mr. Ramsbottom replying to the observations made.

Mr. R. D'O. GOOD (visitor) exhibited specimens of a small species of *Utricularia* from Angola, which in its flowering state is only half-an-inch high.

December 13th, 1923.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 29th November, 1923, were read and confirmed.

Certificates in favour of Cecil Henry Hooper and Alan Sterling Parkes, B.A.(Cantab.) were read for the second time.

Miss Florence Elizabeth Barnett and Miss Christina Barnard were proposed as Fellows.

The following were elected Fellows: Laurence Delaney Cleare, junior; Manaranjan Mitra, M.Sc. (Punj.); Hans Theodor Güssow; Dr. Arthur Francis George Kerr; Ralph Terence St. John-Brooks, M.D.; Miss Dorothy Jean Jackson; James MacDonald; Edward Battiscombe; Hiralli Chennaya Javaraya; Joseph Francis d'Almeida, B.A.; Christopher Carl Hentschel, B.Sc.; Herbert Edward Forrest; Cecil Norman; and Gavin Rylands de Beer, B.A., B.Sc.

The following were elected Associates: James Alfred Wheldon and Alfred Santer Kennard.

Mr. R. D'O. GOOD gave an account of the germination of *Hippuris vulgaris*, Linn., which was communicated by Dr. A. B. Rendle, F.R.S., P.L.S.

The various stages in germination were described from seedlings raised from fruits taken from the gizzards of wild duck shot in Scotland. The first stage is the lengthening of the hypocotyl, which pushes the hard plug out of the foramen of the endocarp. The hypocotyl then turns towards the mud, and produces a ring of root-hairs near its tip. Beyond these hairs the radicle is developed and grows straight down into the mud. While this is

in progress the hypocotyl becomes erect and the cotyledons gradually free themselves from the endocarp which drops clear of the seedling. From this point the vegetative shoot is developed in the cotyledon axil in the normal manner.

The function of the ring of root-hairs was discussed, and the view put forward that its function is to provide a stable base from which the straightening of the hypocotyl can take place, and to ensure that the growing seedling keeps its green parts above the surface of the mud.

The normally delayed germination was also considered and a suggestion made that this is partly due to the mechanical difficulties in the way of immediate germination before the exocarp has decayed. There seems no reason for supposing that passage through the alimentary canal of a bird is a necessary preliminary to germination.

Mr. T. A. Dymes and Mr. H. N. Ridley, F.R.S., took part in a discussion, Mr. Ridley stating that he had seen *Hippuris* fruiting in a Kew tank. The fruits were produced in September and floated for some distance in the tank, slowly sinking. Transferred to a tumbler of water, all sank in a week, one or two sinking each day. The importance of the slow sinking of the seeds of aquatic is very great, as by these means they are carried to a sufficient distance and there sink in a suitable spot.

Mr. A. J. Wilmott stated that he had experience of germination of a seed of *Hippuris* taken from a thirty-year old herbarium specimen, and therefore there are no mechanical difficulties to germination before the exocarp is removed. He suggested that the ring of hairs at the collet enabled the seedling to keep itself vertical on the very soft mud when currents tended to push it over.

Mr. T. A. Sprague and the President contributed further remarks, and Mr. Good replied.

Mr. H. G. JACKSON's paper, "A new Terrestrial Isopod from Zululand," communicated by Dr. W. T. Calman, F.R.S., Sec. L.S., was taken as read.

Mr. C. C. A. MONRO, F.L.S., exhibited a new Polychaete worm, *Mercierella enigmatica*, Fauvel, a brackish-water Serpulid, from the London Docks. On two occasions within the last two years a number of these small worms, which form large masses of inter-lacing tubes on the sides of vessels, have been sent to the British Museum for identification. Examination showed that they possessed characters which justified the establishment of a new genus and a description was prepared, when a paper of Professor Fauvel appeared in which he describes and founds a new genus on the same species. His specimens were obtained from the brackish water of a canal near Caen, where they appeared to have been first remarked some months after they were noticed in the London Docks. Their habit of growing upon floating timber makes it probable that they were imported into this country on the hulls

of ships, and that finding favourable conditions they multiplied abundantly. They now appear to be spreading on both sides of the English Channel.

Professor W. C. McIntosh, F.R.S., and Sir Sidney F. Harmer, F.R.S., joined in a discussion, and Mr. Monro replied to their remarks.

Dr. F. A. BATHER, F.R.S., exhibited specimens of Arachnida from the Rhynie Chert, on behalf of Mr. STANLEY HIRST, F.L.S., illustrating his remarks by lantern-slides.

In Middle Devonian times, on the flat shore of one of the lakes in which the Old Red Sandstone was deposited, near Rhynie, in Aberdeenshire, was a growth of simple plants, with their roots still perhaps under water, but with their leafless stems stretching into the air. They are the oldest air-breathers that we know among plants. From time to time the lake rose and deposited a thin layer of sand over the plants; it seems to have received from hot-springs water with silica in solution, and this petrified the vegetable mass, turning it into chert. In these waters swam numbers of small crustaceans, and in the chert are found their chitinous remains, together with the remains of Arachnida, which crept among the stems of the plants and are thus the oldest air-breathers that we know among animals.

Among these arachnid remains, Mr. Stanley Hirst has distinguished one species of mites (Acari), one species doubtfully referred to the spiders (Araneæ), and five species belonging to two genera of Anthracomarti. He has described these in the 'Annals and Magazine of Natural History' for October, 1923 (ser. 9, vol. xii. p. 455). Of the Anthracomarti, which are ancestral to the Pedipalpi (whip-scorpions and their allies), and the Opiliones (harvest-spiders), several genera and species have been described from our British Coal-Measures. Their Devonian representatives are much smaller and are distinguished by two small caudal segments, clearly the degenerate remains of a once larger tail.

The existence in Devonian times of a representative of so highly specialized a group as the Spiders, and still more of such degenerate forms as the Mites (previously unknown before Tertiary times) is so astonishing as to demand confirmation. But in any case the occurrence of Anthracomarti suggests that the evolution of Arachnida from the primitive Arthropod stock may have begun in Silurian times. Whether terrestrial Arachnida existed so early as to be able to give off the water-breathing Merostomata of the Ordovician (as some now maintain) must be still a very open question.

Mr. R. I. Pocock, F.R.S., offered some observations on this exhibition.

The last paper was by Dr. F. A. BATHER, F.R.S. (communicated by Dr. W. T. Calman, F.R.S., Sec.L.S.), on "Binary and Binominal Nomenclature."

An animated discussion followed in which Dr. E. J. O. Hartert and Dr. K. Jordan, F.R.S. (both visitors and members with Dr. Bather of the International Commission on Zoological Nomenclature), Lord Rothschild, F.R.S., Mr. Oldfield Thomas, F.R.S. (visitor), Mr. R. I. Pocock, F.R.S., Mr. A. J. Wilmott, Mr. C. C. Lacaita, and Mr. T. A. Sprague engaged, Dr. Bather replying.

January 10th, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 13th December, 1923, were read and confirmed.

Certificates in favour of Miss Florence Elizabeth Barnett and Miss Christina Barnard were read for the second time.

Dr. William Jenkins Webb Anderson, M.D.(Leeds), and Dr. Richard Sanders Rogers, M.A., were proposed as Fellows.

Mr. James Macdonald was admitted a Fellow.

The President announced that a Ballot would be taken on the 6th March next.

Mr. A. J. WILMOTT exhibited specimens of *Myosotis sicula* Guss., discovered by him in Jersey in 1922; of *Alchemilla pastoralis* Buser, rediscovered in Teesdale by him last year; of *Alchemilla glomerulans* discovered in the herbarium of Rev. J. Roffey and now presented to the Natural History Museum; of *Pulmonaria* from the New Forest, which he identified with *P. longifolia* (Bast.), a West European species, and not as formerly with *P. azurea* Bess., a species of Middle and Eastern Europe; of the British *Viola* which has been incorrectly named *V. epipsila* Fr., but which may be the Portuguese *V. Juressi* K. Wein; and of the rediscovered *Geranium purpureum* of the 'English Botany' which he has named var. *Forsteri*. Various points of interest concerning them were indicated with the help of additional specimens.

In the discussion which followed, Mr. C. E. Salmon, Mr. H. W. Pugsley, Mr. H. N. Ridley, F.R.S., Mr. Walter Watson, and Mr. T. A. Dymes took part, and Mr. Wilmott replied.

Mrs. HENSHAW, a visitor, showed a series of about 80 slides, most of them coloured from nature, of the scenery and flowers of British Columbia.

The President, Mr. A. H. Maude (who lamented the absence of a complete Flora of Canada, for which one had to use A. Gray's "Synopsis" intended for the United States and wanting many of the more Northern species), Mr. Gerald Loder, and Mr. C. E. Salmon spoke on the paper; Mrs. Henshaw briefly acknowledged the recognition of the interest which had been shown in her account of "Plant-life in British Columbia."

Mr. R. H. BURNE showed from the Museum of the Royal College of Surgeons a series of dissections of the carotid arteries of Sharks belonging to the families Carchariidæ and Lamnidæ. In many members of these families the carotid arteries are more or less convoluted, and in extreme cases (e.g. *Lamna*) break up to form massive plexuses of fine anastomosing vessels before giving off their branches of distribution. The examples shown included *Galeus* and *Zygana*, in which the contortion of the arteries is relatively slight; *Carcharias* and *Alopias*, in which the convolution is very extensive and elaborate, forming masses of tight coils behind and within the orbit; and *Lamna*, in which the arteries are not only extensively contorted but become broken up into dense plexuses from which arise the normal branches of distribution. It was pointed out that when the modification is extreme the vessels involved show an increase not only in length but also in calibre, and it was suggested that by this means a blood reservoir is formed to maintain a constant and optimum supply of blood to the brain and eyes.

Sir S. F. Harmer, K.B.E., F.R.S., Lieut.-Col. J. H. Tull Walsh, and Mr. Walter Watson contributed further remarks, and the exhibitor replied to the questions asked.

Dr. W. T. CALMAN, F.R.S., Sec.L.S., exhibited a microscopic preparation of a remarkable ciliate Infusorian and made the following remarks:—

Teuthophrys triscula is a pelagic Infusorian recently described by Chatton and de Beauchamp (Arch. Zool. Expér., Notes et Revue, lxi. 1923, p. 123) from a mountain lake in the Vosges. The generic name alludes to the fact that the rounded body and three radially-disposed arms give it somewhat the aspect of a microscopic cuttlefish. Two microscopic preparations of a very similar if not identical organism from distant parts of the world are in the collection of the British Museum (Natural History), to which they were presented in 1910 by the late Mr. C. F. Rousselet. The specimens now exhibited were hatched from mud sent to Mr. Rousselet from an unspecified locality in Victoria, Australia. Previously Mr. Rousselet had collected the same organism at Capetown, and it is mentioned in his paper on "Rotifera of S. Africa" (Journ. R. Micro. Soc. 1906, p. 396). In addition to these, I have also examined living specimens hatched from soil from a dried-up rain pool at Hermannsburg in Central Australia.

January 24th, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 10th January, 1924, were read and confirmed.

Certificates in favour of Dr. William Jenkins Webb Anderson, M.D.(Leeds), and Dr. Richard Sanders Rogers, M.A., were read for the second time.

Robert Vernon Giffard Woolley and Miss Philippa Chicheley Esdaile, D.Sc.(Manch.), F.Z.S., were proposed as Fellows.

The President explained that the expected lecturer, Professor A. A. LAWSON, had not reached England as yet, and for the purpose of the present meeting a special programme had been arranged.

The first paper was by Mr. F. HOWARTH, B.Sc., on "The sexuality of *Ustilago*." After describing the general life-history of the smut fungi the minuter details of development were considered. The chlamydospore on germination in nutrient media produces a short promycelium which becomes transversely three-septate, each cell giving rise to a sporidium. The sporidia increase by budding. Brefeld found that if cultures of sporidia be kept until the nutrient of the medium is exhausted the sporidia can conjugate in pairs. Further, in exhausted media chlamydospores on germination form a four-celled promycelium, but no sporidia; conjugation in this case occurs between the four cells. Dangeard showed that the young chlamydospore is binucleate but that it becomes uninucleate as it matures. On germination the nucleus wanders into the promycelium and divides. The two nuclei divide again and when septa are formed between them there result four uninucleate cells. The sporidia also are uninucleate. Rawitscher found that in all cases of conjugation, whether between sporidia or the cells of the promycelium, the nuclei do not fuse but lie in close association. The mycelium formed is binucleate and this condition lasts until chlamydospore formation.

The author described some of his work with the cereal smuts of barley and oats, *Ustilago Hordei* and *U. Avenae*, in which he had attempted to define the conditions under which sporidial conjugation might or might not occur, following on Kniep's work on *Ustilago violacea*. Single chlamydospores were isolated, and on the formation of sporidia these were separated and pure cultures made before they could conjugate. In this way thirty to fifty cultures were obtained. These were then tested in pairs under conditions which would allow of conjugation if such were possible. As a result it is possible to state that the sporidia of *U. Hordei* and *U. Avenae* can be divided into two groups. The sporidia of one group will not conjugate amongst themselves but will readily do so

with those of the other group. Both strains, so far as one can ascertain, are absolutely identical morphologically but differ physiologically, the difference revealing itself in the capacity to conjugate.

On a gelatine or agar gel containing 5 per cent. malt extract conjugation will not occur, but does so readily on similar medium with 1 per cent. malt extract. Conjugation can take place on a gelatine medium, though it occurs more quickly on an agar gel under similar conditions. Conjugation does not occur in the absence of oxygen; nor does it occur in an atmosphere of carbon-dioxide, nitrogen or hydrogen. Conjugation occurs best on a neutral or slightly alkaline medium; beyond a small range on the acid or alkaline side conjugation is inhibited.

After some remarks by the President, Dame Helen Gwynne-Vaughan raised the point as to when reduction takes place in the nuclear divisions in the promycelium and whether this could be regarded as occurring at the first division as suggested. Professor V. H. Blackman pointed out that Kniep's idea was that reduction took place in the first division. Dr. W. Bateson remarked on the importance of such researches from a geneticist's point of view, and Mr. J. Ramsbottom on their significance from a systematic standpoint. Mr. R. Paulson suggested that examination under ultra-violet rays might possibly show some difference between the two sets of nuclei in the promycelium.

Dr. C. J. GAHAN (visitor) exhibited living specimens of a Firefly, *Pyrophorus punctatissimus* Blanch., from the Argentine, and commented on the position of the three luminous organs and the circumstances under which the light is emitted.

Sir Sidney F. Harmer, K.B.E., referred to the great interest of the exhibition of these beetles in a living state.

Mr. J. R. NORMAN, F.L.S., exhibited a specimen of the Greenland Halibut (*Reinhardtius hippoglossoides*), a fish apparently new to the British fauna. The specimen was caught off the south coast of Ireland, latitude 52° 30' N., at 170 fathoms, and was sent to the British Museum by Professor W. M. Tattersall, of Cardiff. Normally an arctic and sub-arctic species, it extends southwards on the western side of the Atlantic to the Grand Banks off Newfoundland (latitude 40°-50°); but on the eastern side it does not extend nearly as far southwards, and, according to Dr. Smitt, "perhaps not much south of the 70th degree of latitude." From its nearest relative, the Common Halibut, it differs especially in the plumper body, larger mouth, and stronger teeth, in the left eye being on the upper surface on the head and the dorsal fin commencing behind it, and in being coloured on both sides. In the young, however, the blind side is colourless. It appears to be a species which is in process of discarding the habits characteristic of the order, and has regained to a certain extent its original symmetry.

He also showed a cast of the head of another specimen of the same species, stated to have been landed at Hull, but where it was caught is not known.

The following discussed the exhibition: Mr. R. H. Burne, Sir Sidney F. Harmer, K.B.E., and Mr. W. S. Rowntree, Mr. Norman replying.

Mr. H. W. MONCKTON, Treasurer and Vice-President, exhibited a specimen of *Orthotrichum cupulatum* Hoffm., which he found growing on a large calcareous fossil coral which had lain for many years on a wall at West Holme, near Wareham, Dorset, the residence of Mrs. W. H. Hudleston.

This moss is usually found on calcareous rock, and the point of interest was that it should have been found on this bit of limestone in a district of Bagshot sand. The nearest calcareous formation is the chalk some two miles to the south and south-west of the locality of West Holme.

Mr. J. RAMSBOTTOM, O.B.E., Sec. L.S., followed with an account of the fungus flora of British woodlands. He stated that apart from the part played by microfungi which pass at least a portion of their life-history in the soil and are concerned in soil fertility, there have to be considered the perennating mycelia of the larger fungi and the relation of these to the mycorrhiza of trees. Moreover, since fungi are either saprophytes or parasites their distribution is dependent on that of higher plants, and consequently each association has its characteristic fungus constituents. As is to be expected, in the woods most difference is met with between the ground flora of coniferous woods and that of deciduous woods. A large series of coloured slides was shown of characteristic species of oak, beech, birch, and pine woods, and points of biological interest commented on. The manner in which certain species of fungi "follow" a given tree, e.g., *Amanita muscaria*, *Tricholoma fulvum*, *Lactarius turpis*, and *Cortinarius hemitrichus* under birches, is a matter which requires further investigation.

The President expressed the thanks of the meeting to the Visitors and Fellows who had helped to provide an interesting programme at short notice.

February 7th, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 24th January, 1924, were read and confirmed.

Miss Vera Adelaide Irwin-Smith, B.Sc., and Mr. Christopher Carl Hentschel, B.Sc., were admitted Fellows.

Certificates in favour of Robert Vernon Giffard Woolley and Miss Philippa Chicheley Esdaile, D.Sc.(Manch.), F.Z.S., were read for the second time.

Miss Annie Ethel Cook, B.Sc.(Lond.), was proposed as a Fellow.

The President announced that there are three vacancies in the list of Foreign Members, and that the date for nominations will be the 6th March. The vacancies are due to the deaths of Professor Franz Eilhard Schulze, Professor Oscar Hertwig, and Professor Johan Nordal Fischer Wille.

Mr. E. J. COLLINS, B.Sc., read a paper on "Sex-conditions in *Silene nutans* Linn." He stated that from the recorded facts of sex distribution, *Silene nutans* may be described as a triœcious species. Two plants and seed of *S. nutans* var. *Smithianus* were received from Mr. C. E. Salmon, F.L.S., in 1917. It was hoped that by raising seedlings of this form, light would be thrown upon the relationship between hermaphroditism and diœcism and the question of sex determination in flowering plants generally. Upon flowering in 1918, one of the plants proved to be female and one hermaphrodite, but it must be stated that the female plant threw a few hermaphrodite flowers in the following year and subsequently became wholly hermaphrodite. Seedlings of varied parentage have now been raised and their sex condition recorded. In each individual progeny, hermaphrodite plants, plants of mixed sex, *i. e.*, bearing ♀ and ♂ flowers together with flowers with a reduced number of stamens, and plants ostensibly female were noted. The ostensibly ♀ plants were divided into two groups, (*a*) those incapable of producing seed, neuters, and (*b*) those producing seed. The female condition of the plants in the latter group may continue for one, two, or three years, and possibly a few will remain outstanding as female seed-bearing plants, but soon or late maleness appears to break out in varying degree, and finally the hermaphrodite condition may be reached. No definite change in the reverse direction has been noticed. Plants of mixed sex may show a bias either towards hermaphroditism or femaleness during the season. The bias may undergo reversal between the flowering axes of the different order of branching, thus giving different sex phases with time and growth.

In all 1139 plants have been raised grouped as follows:—Hermaphrodite, 480; mixed, 307; female seeding, (*a*) outstanding female 14, (*b*) with some degree of maleness ultimately recorded, 136; female-neuters, 202.

The possible origin of the neuter-type and the general bearing of the facts upon the question of sex determination were dealt with.

Dr. W. Bateson, F.R.S., and Dame Helen Gwynne-Vaughan, D.B.E., contributed further remarks.

Professor TEIZO NIWA gave an account of the forms cultivated in Japan from the original types of *Chrysanthemum indicum* Linn. and *C. sinense* Sabine. He said that among the many species of *Chrysanthemum* which are wild in Japan, there are two which approach nearest to the cultivated chrysanthemum, namely *C. indicum* and *C. sinense* Sabine. In the Tokyo 'Botanical Magazine' for 1909, Mr. Makino described a wild specimen as *C. sinense*, but this differed from the true plant; for the plant so widely cultivated the name *C. sinense* Sabine var. *hortensis* Makino, has been employed.

In Japan there are over fourteen sections of the species, that is, garden not botanical varieties; they transmit their characters very rarely by seed. Garden classification depends on the flower, but also in some degree upon the leaf. The aim of the present communication is to show how cultivation and artificial selection through many generations have affected the type.

In explaining the photographs indulgence was craved for the use of Japanese names in some cases, as English names have not been adapted to all the varieties.

C. sinense Sabine: San-giku (Mountain C.). The plants of this section resemble the wild type, they are dwarf, with small foliage, and the flowers small, single or demi-double. Next were shown the effects of Cascade training, and a private show in Kyoto, the old capital of Japan; then plants used by the Imperial family in Tokyo. "Nanako-giku," Pompone: Higo-giku (Higo is the name of a province in the southern island, Kyushu); Choji-giku, anemone-flowered Chrysanthemum; Chu-giku, or Kurui-giku, mobile petalled Chrysanthemum. Plant and foliage of medium size, flowers semi-double, with perfect disk florets. The petals are at first extended outwards, but after ten days or so they assume a spiral, clockwise or counter clockwise. Slides shown: Folding clockwise; in bud; stage of expansion; stage of closing.

Next were shown a display of transplanted specimens in the Imperial garden, in two views. Hironoshi-giku; Broad petalled Chrysanthemum. Grows about 8 ft. high, with single stem; leaves large, flowers broad, 9 to 12 in. across, petals flat, 1 to 1½ in. wide. This form is believed to be the source of the crest of the Imperial family.

Hosokuda-giku; Thread-petalled Chrysanthemum. Like the last, but the flowers are sometimes over 2 ft. in diameter.

Oh-giku: large Chrysanthemum. Sometimes 13 feet in height, flowers 10-19 inches across. Specimens with guard petals are most valued.

Curled type, and Ball type.

Chrysanthemum festival of Imperial family.

Giant training imitated after Mount Fujiyama. These usually bear 400-500, or even as many as 1000 flowers, each 8 inches across; plant 18 feet wide, 10 feet high, and 12 feet through.

Azami-giku; Thistle Chrysanthemum.

Ise-giku; Ise is a province of Central Japan.

Saga-giku. Saga, a village near Kyoto; in flowerbud; opening; full-bloom.

Besides these shown there are Kezashi-hira-giku, Hairy Chrysanthemum with fine hair-like spines on back of petals, Kagari-hira-giku, Fimbriated Chrysanthemum with petals split at the top, and Ryori-giku, Edible or Cooking Chrysanthemum. Under each of these sections are many varieties.

Much depends on cultivation of the three types of petals, flat, quilled, or tubular, and varieties may wear out by constant vegetative reproduction; nevertheless, if cross-fertilized, the seedlings show their pristine vigour. The last photograph showed a multiple sort, recalling in some degree the "Hen and Chickens" Daisy.

The President commented on the interest of the photographs and Japanese prints shown by means of the episcope; Professor Niwa replied to certain questions addressed to him.

The PRESIDENT exhibited a fasciated stem of a Rose tree, given to him by Mr. Ernest Dixon, a nurseryman at Putney, who had shown a three-flowered head of a Daffodil on the 19th April, 1923.

Mr. H. W. PUGSLEY exhibited specimens of an undescribed *Statice* from Pembrokeshire, which he proposed to name *S. transwalliana* in allusion to the district where it occurs. It was found growing on the coast in company with *S. binervosa* G. M. Sm., from which it differs in its much dwarfer habit, remarkably narrow, linear, oblong leaves, and very dense spikes of small flowers with stellate corollas only half as large as those of *S. binervosa*. It was pointed out that the new plant, like *S. binervosa*, fell within the generic section *Limonium*, series *Densiflora*, of Boissier, and its differences from *S. recurva* C. E. Salmon and other Continental allies were also alluded to, and grounds for regarding it as a new endemic species briefly explained.

Mr. C. E. Salmon, Mr. A. J. Wilmott, and Mr. E. G. Baker offered further observations, and the exhibitor replied.

Mr. T. A. SPRAGUE exhibited a seedling of *Galium Aparine* with three branches in the axil of each cotyledon. Accessory buds are characteristic of many Leguminosæ, Rosaceæ, Cornaceæ, Caprifoliaceæ, Rubiaceæ, and Oleaceæ, usually on the adult plant. They seem to occur less frequently in the axils of the cotyledons. In the case of *Galium Aparine*, however, the reverse is the case. Like *Stellaria media*, *Galium Aparine* exhibits anisoclady—unequal development of the (usually solitary) axillary branches of the leaves of each pair. Owing to the leaves arising from the angles of the stem, and the axillary branches arising from the faces, the successive branches in the axil of the same cotyledon or ordinary leaf arise alternately to right and left, branches 3 and 4 arising below 1 and 2 respectively. For some unexplained reason, the

primary branches in the axils of the cotyledons and the strong branch of the node above appear to be constantly on the same side of the stem.

The President, Mr. E. J. Collins, and Sir David Prain made additional comments, the latter upon *Catha edulis*, in which one axillary bud develops into a flowering branch with opposite leaves, the other axillary bud grows into a branch with alternate leaves but without flowers.

February 21st, 1924.

Dr. A. R. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 7th February, 1924, were read and confirmed.

Dr. Ralph Terence St. John-Brooks and Mr. Gavin Rylands de Beer, B.Sc., were admitted Fellows.

A certificate in favour of Miss Annie Ethel Cook, B.Sc.(Lond)., was read a second time.

Dr. J. WATERSTON exhibited a number of Orthoptera and allied insects, with explanatory notes on the following;—

(a) *Arixenia jacobsoni* Jord., allied to the earwigs; predaceous on insects feeding on bat guano in caves in Java.

(b) *Hemimerus talpoides* Wlk., an ectoparasite of *Cricetomys gambianus*.

(c) *Tmethis cista* Fabr., *Sphingonotus balteatus* Serv., and *Bryodemia tuberculata* Fabr., to illustrate homochromy, etc.

(d) *Systocelia obsidata* Karsch (E. Africa), *Bradyporus dasypus* Illig. (Macedonia), to illustrate methods of stridulation.

(e) Examples of mimicry in S. American genera *Chlorophylla* and *Typophyllum*, etc.

(f) Recent observations on the biology of the migratory locust.

Dr. B. Uvarov (visitor), Mr. W. S. Rowntree, and Mr. E. J. Collins contributed further remarks, and Dr. Waterston replied.

Mr. G. C. ROBSON exhibited a Cephalopod (*Histioteuthis bonelliana* Fér.) with abnormal reproductive system.

A male specimen of this species (a form interesting in more respects than those actually demonstrated) obtained by Dr. J. D. F. Gilchrist, off the Natal Coast, was found to have its reproductive system completely developed (including the spermatophores) with the exception of the testis which is represented only

by a minute piece of tissue. The question whether the testis is *undeveloped* or *atrophied* was discussed, and the significance of this condition in relation to the development of the rest of the generative system was pointed out.

Prof. E. S. Goodrich, F.R.S., who referred to the asymmetry of the specimen, Mr. R. H. Burne, and Mr. W. S. Rowntree spoke on the interest of the exhibition.

Dr. J. M. DALZIEL gave a lecture on West African Vegetation, illustrated by about 80 lantern-slides. He began by describing the creeks in the delta of the River Niger and the mangroves and other vegetation on their banks, the moist climate, and heavy rains; proceeding up the country, with views of the forests with their open ways between the trees, the river in flood, the fall of standards undermined by the floods, sometimes, as shown, forming a bridge across a stream or blocking traffic on a motor road, next passing further inland, with the park-like appearance of the highlands with scattered trees. The more noteworthy of the trees, as the *Bombax*, and *Butyrospermum* yielding shea butter, much used in the preparation of cheap chocolates, finishing with a view of mimosa-scrub of *Acacia albida*, with its camels, showing the influence of the Saharan element in the flora.

The discussion which followed was opened by the President, who referred to certain specimens of bulbous plants occurring in collections, and inquiring how these escaped destruction in the grass fires; Major Chipp, who stated that the lecturer was probably the best acquainted with the country of any European; Lieut.-Col. J. H. Tull Walsh, and Mr. Burt-Davy. Dr. Dalziel replied that many bulbs escaped the ravages of the grass fires by being several inches below the surface, that others grew amongst scattered tufts of grass, as *Panicum stagninum*, thus avoiding great heat, and that though *Leersia hexandra* grew in Nigeria, it did not form continuous growths, but occurred in detached specimens.

March 6th, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 21st February, 1924, were read and confirmed.

The following were proposed as Fellows:—

Miss Dorothy Iva Dawson; Surenda Lal Ghose, M.Sc.(Punj.), Ph.D.(Cantab.); Lieut.-Col. Edwin Harold Brown, I.M.S., M.D.; and Frederick Robert Stephen Balfour, M.A.(Oxon.), J.P., D.L., Peeblesshire.

The following were proposed as Foreign Members :—

Professor Dr. Hans Oscar Juel, Uppsala; Dr. Johannes Schmidt, Carlsberg Laboratorium, Copenhagen; and Dr. Hans Spemann, Freiburg-im-Breisgau.

The following were elected Fellows :—

Cecil Henry Hooper, F.R.H.S.; Alan Sterling Parkes, B.A. (Cantab.), Ph.D.(Manch.); Miss Florence Elizabeth Barnett, B.A., M.Sc., Ph.D.(Lond.); William Jenkins Webb Anderson, M.D. (Leeds); Richard Sanders Rogers, M.D.; Robert Vernon Giffard Woolley; Miss Philippa Chicheley Esdaile, D.Sc.(Manch.), F.Z.S.; and Miss Annie Ethel Cook, B.Sc. (Lond.).

The first communication was by Dr. E. J. SALISBURY, whose remarks were illustrated by an extensive series of lantern-slides. The International Phytogeographical Excursion in Switzerland, held during the summer of 1923, was brilliantly organized by Professors Schröter, Rübel, and Brockman, of Zurich. The party had to be restricted to thirty guests, who represented fourteen nationalities, but the number was temporarily augmented by botanists having specialist knowledge of the areas visited. Great Britain and Ireland were represented by Dr. Lloyd Praeger, Professor Yapp, and the speaker.

After inspecting the Botanical Departments of the University, the first few days were devoted to a study of the hills around Zurich. Here the development of pure Beech wood, in succession to felled mixed wood, was noticed as a consequence of selective sprouting of the cut stumps. In the Spruce woods, regeneration by Hornbeam, Beech, etc., was a marked feature of the "light chimneys" caused by the death of Spruce trees owing to the parasitic *Fomes annosus*. At the Forestry Station numerous interesting experimental results were demonstrated, of which perhaps the most striking were those showing diminution of height in Spruce with increase of the altitude of the source of origin of the seed, and the much greater vigour of *Quercus Robur* than of *Quercus sessiliflora* on calcareous soils.

The borders of the Vierwaldstättersee demonstrated the effect of local climatic influence in causing the replacement of Spruce by Pine. Reaching Mount Pilatus (6922 ft.), where the night was spent, an opportunity was afforded of studying the altitudinal zonation of montane vegetation in an Oceanic climate. The chief zones noted were Arrhenatheretum (to 1625 ft.), Fagetum (1625-4250 ft.), Picetum (4250-6337 ft.), followed above by Alpine pasture dominated by *Carex sempervirens* and *Sesleria caerulea*. The summit is occupied by *Androsace helvetica*, *Rhamnus pumila*, etc., and scree with a variety of species playing various rôles in the colonization and stabilization of the mobile substratum.

From Zurich via Chur and Thusis, the route was followed to Zerneß with its Continental climate (-27° C. to $+30^{\circ}$ C.) and low

rainfall with respect to its high temperature (28° C.). Here on the southern exposures a markedly thermophile vegetation was observed, in which a number of species, which also characterize the dry sandy heaths of Breckland in this country, were noticed.

From Zernez by the wild valley of Cluozza the National Park was reached. This is a nature reserve of fifty square miles in extent, mainly occupied by fine woods of *Pinus sylvestris* v. *engadinensis*, *Pinus montana*, and *Larix*. The absence of deciduous woods is to be correlated with the climatic conditions. An ascent of Mount Buffalora (8545 ft.) afforded an opportunity of examining the superb wood of *Pinus Cembra* with its undergrowth of *Rhododendron ferrugineum*, which extends to 7475 ft. The prostrate form of *Pinus montana* here attains the altitude of 7960 ft. Near the summit the presence of *Ranunculus glacialis* emphasizes the hardness of this species, which attains a higher altitude in Europe than any other flowering plant (viz. 13,894 ft.).

From Zernez by way of St. Moritz and Pontresina to the Bernina Hospice, whence days were spent in traversing the Diavolezza and Morteratsch glaciers with their rich moraine floras, the Cambrena delta, and the famous Illeuthal. Apart from the moraine plants, such as *Epilobium Fleischeri*, *Sieversia reptans*, *Saxifraga* spp., etc., the chief features of interest here were the Schneetälchen with their peculiar flora of mostly glabrous-leaved species, of which the following are characteristic: *Anthelia Juratzkiana*, *Salix herbacea*, *Alchemilla pentaphylla*, *Arenaria biflora*, and *Cardamine alpina*.

From the heights of the Bernina Alps with climatic conditions comparable to those of Greenland the descent was made into the hot valleys of Italy. *En route* the colonization of the successive terminal moraines of the Palu Gletscher not only showed stages in the development of Larch forest, but also gave visible evidence of the gradual retreat of the glacier foot.

The neighbourhood of Tirano afforded an opportunity of studying the warm climate type of vegetation of the southern side of the Alps. On the siliceous soils here, besides species which are normally silicicole with us there were present such species as *Galium cruciatum*, *Silene nutans*, and *Carlina vulgaris*, emphasizing the fact that the calcicole flora of our own country is in part at least recruited from species for which the physical characteristics of the soil are more important than the chemical.

At Lugano the interesting interglacial beds were visited and the ascent made of Monte San Salvatore, formed of calcareous rocks resting on a non-calcareous base. The latter bears chestnut woods, whilst the upper part is clothed with Beech woods in which *Fraginus Ornus*, *Ostrya*, *Ulmus*, and *Laburnum* are conspicuous. The ground flora is rich in species. *Helleborus niger*, *Cyclamen europaeum*, and *Anemone Hepatica* are prominent among the spring species, and there are several endemics such as *Leontodon tenuiflorus* and *Crepis Frohlichiana*. *Brometum erecti* is an important vegetation type as with us, whilst on the gentle slopes where

leached soil has accumulated, *Pteridium* and *Calluna* occur, the latter with the roots of the adult plants penetrating the unleached subsoil below.

On Lake Maggiore the famous sub-tropical gardens of the Isola Bella were visited. Here the Tea tree, Bamboos, *Cinnamomum Camphora*, etc., grow to a large size.

The high alpine flora which had already been studied in the Bernina mountains was again prominent in the Zermatt region. It was well exemplified on the Gornerg'rat by such cushion species as *Eritrichium nanum*, *Gentiana brachyphylla*, *Cherleria sedoides*, etc.

The next stopping place was the Hospice of St. Bernard, whence, on the way to Martigny, the Alpine gardens at Linnaea, founded in 1889, were shown by Professor Chodat. Thence to Montreux and Lauterbrunnen, where the consociates of *Calamagrostis argentea* on the calcareous scree gave place below to *Corylus* scrub, which in its chief elements was strikingly similar to our own chalk scrub.

The trip ended with a visit to Wengern Alp and the Jungfrauoch.

An interesting discussion followed, Professor Weiss, Mr. A. J. Wilmott, Dr. Stapf, Dr. A. W. Hill, Mr. A. H. Maude, and Mr. H. N. Dixon participating, and the author replied.

Miss HELENA BANDULSKA, F.L.S., then gave a paper "On the cuticles of some recent and fossil Fagaceæ."

The President, Dr. D. H. Scott, Dr. E. J. Salisbury, Mr. Wilmott, and Dr. W. T. Calman engaged in a discussion, the author replying.

The last paper was by Mr. H. SANDON and Mr. D. W. CUTLER, F.L.S., entitled "Some Protozoa from soils collected by the 'Quest' (1921-22) Expedition," which was read in title.

March 20th, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 6th March, 1924, were read and confirmed.

Miss Annie Ethel Cook, B.Sc. (Lond.) and Miss Dorothy Jean Jackson were admitted Fellows.

The following Certificates were read for the second time :—

Miss Dorothy Iva Dawson ; Surendra Lal Ghose, M.Sc. (Punjab), Ph.D. (Cantab.); Lieut.-Col. Edwin Harold Brown, I.M.S., M.D.; and Frederick Robert Stephen Balfour, M.A. (Oxon.), J.P., D.L., Peeblesshire, for Fellows.

Dr. Hans Oscar Juel; Dr. Johannes Schmidt; and Dr. Hans Spemann, for Foreign Members.

The President announced that the Ballots will be taken on the 1st May and 19th June.

Miss M. RATHBONE exhibited dwarf oaks of about twelve years old, grown in a pot, and subjected to the leading shoots being pinched back, and any roots from the bottom of the pot being cut away.

The General Secretary stated that he had sown a ring of oaks round a circular bed in a garden at Stockwell, which had been kept dwarf in successive years by cutting back.

Professor TEIZO NIWA exhibited trees dwarfed by Japanese methods and read the following explanation:—

For decoration both herbs and trees are grown in Japan in pots, concerning which I am to speak this afternoon. The trees may be arranged for (1) foliage, (2) for flowers, and (3) for fruit. These products are usually proportionate to the size of the trees. They are grown from seed or by grafting, or from native places, but conifers are not easy to graft, and are usually taken from wild specimens, or seed. *Prunus Mume*, very popular as a flowering tree for the New Year, is usually grafted. In some cases the specimens are cut down like Chrysanthemums. When well-shaped branches occur, they are often layered, and when rooted the branch is severed and potted. Pine-trees are kept in a dry and barren soil; during the first few years plants subjected to the dwarfing treatment retain the normal size of their leaves, then they diminish to the dwarf size.

Certain plants produce both flower- and leaf-buds for the following year, such as *Prunus yedoënsis* which blooms in April at Tokyo, followed by leaves; by May or June the rudiments of flowers and leaves are already formed for the next year, and by forcing they may be made to flower in January, or even with difficulty by the previous November. Before forcing, if the leaves have not naturally fallen, the specimens are enclosed in an ice-chamber to act as in artificial winter, after which they are gradually brought into heat and light. After flowering it is usually planted out, to restore its strength, and fed well; later potted in barren soil to induce the production of flower-buds.

As a rule, dwarf plants must have a naturally dwarf character, but one of the cherries, *Malus floribunda* Sieb., is not a true dwarf, but is kept small by pruning. Long experience is needed in dwarf production, especially when applied to the tiny gardens so much esteemed in Japan. The chief plants grown as dwarfs may be set out as: *Chamaecyparis obtusa* Sieb. et Zucc., several varieties, *Juniperus chinensis* Linn., *Cryptomeria japonica* Don., *Pinus densiflora* Sieb. et Zucc., *P. parviflora* Sieb. et Zucc., *P. Thunbergii* Parl., *Acer palmatum* Thunb., *Malus floribunda* Sieb.,

Prunus yedoënsis Mast., *P. Mume* Sieb. et Zucc., *Hamamelis japonica* Sieb. et Zucc., not to specify those grown for fruits, or herbs for dwarf growth.

The President opened the discussion, followed by Lieut.-Col. Tull Walsh, Miss Prankerd, and Mr. A. J. Wilmott (who commented on the absence of annual rings in the wood of these dwarfed trees).

Mr. MARIUS MAXWELL showed a large series of coloured photographs, entitled "Stalking Big Game with a Camera." (Communicated by Dr. W. T. Calman, F.R.S., Sec. L.S.)

The lecture was illustrated by some of the most wonderful photographs of East African big game that have ever been taken. The areas investigated were: (1) Amala River district, South Kenya Colony; (2) Area of the Northern Guaso Nyiro and Lorian Swamp.

The first slide shown was of the African Buffalo—a photograph at very close quarters of perhaps the most dangerous animal in Africa. Next followed slides showing the African Black Rhinoceros in North Kenya Colony, both at rest and drinking from a salt lick. The Hippopotamus was then shown. The Lorian Swamp gave exceptional opportunities of photographing numbers of this animal, which had taken up practically a terrestrial mode of life. One slide showed a baby animal asleep: the next, its photograph when awakened by the snap of the camera shutter. Several slides showed adult animals in the desert-like country hemmed in by the thick prickly bush through which they could not pass.

Most of the slides were coloured, those showing giraffes in movement being exceptionally pleasing. These photographs were taken from a Ford car, the maximum speed of the giraffe as registered by the speedometer of the car being thirty-two miles per hour. The last set of slides were of the Elephant from the Amala and the Lorian Swamp. The first series showed an elephant advancing towards the photographer, the last photograph being taken at very close range. Amongst the others was one showing a bull elephant emerging from a dense Euphorbia thicket. The photographs of the Lorian Swamp elephants were exceedingly fine and showed a group advancing in a rough V formation to attack the photographer. Mr. Maxwell stated that on this occasion it was necessary to fire in order to stop a charge. The last slide was a magnificent photograph of a bull elephant taken at 8 yards' range, the animal closely regarding the operator.

After the President had commented on the remarkable interest of the slides, Mr. Guy Dollman (visitor) spoke. The slides were of considerable value both from a taxidermic and from a scientific point of view. Though the American ideal that a taxidermist should also be an artist and big game hunter was impossible of

attainment, a taxidermist must be an artist to be successful. In this connection photographs such as those shown would be of great importance in assisting taxidermists in mounting specimens. In the case of the slides of elephants there was a series of "close ups" of animals of both sexes in many attitudes and of all ages. These have already been of considerable assistance in the mounting of a large bull elephant's head presented to the Natural History Museum by the lecturer. The hippopotamus photographs would be of similar value for taxidermic purposes. Another feature was the value of the clear details of the surrounding scenery to those who were engaged in setting up groups of large animals in their natural surroundings. From the scientific point of view there were many interesting features. For example, from the Elephant series it might be possible to determine whether or not the shape and size of the ears were constant in the various types of elephants and whether such points could be relied upon for systematic diagnosis. It is also remarkable to note the different habitats of the elephants of the Amala region, which were shown among forest growths into which they retreat for shelter during the heat of the day, and those of the Lorian Swamp, which showed elephants standing amongst grass and rushes not more than 8 feet high with their backs fully exposed to the sun. Corresponding with this difference in exposure the skin of the backs of the latter was thicker and rougher.

The Hippopotamus slides were also of considerable scientific importance. The animals were shown to be almost graceful in form, with well proportioned legs and quite unlike the type of beast one usually sees in menageries or museums. The question arose as to whether or no these particular animals owing to their semi-terrestrial habits had not undergone some modification perhaps of sufficient importance to interest the systematic workers.

Lieut.-Col. J. H. Tull Walsh made some remarks on the protection afforded to animals by their general colouring, especially when standing stock-still. The Indian elephant was much easier to approach than the African and generally more docile and intelligent. Mr. H. N. Ridley remarked that the Malay elephant in a wild state goes straight for you on sight.

Mr. J. C. Dollman (visitor) spoke of the artistic side of the exhibition, the animals at rest being most valuable as studies for painters.

Sir S. F. Harmer spoke of the great interest of the photographs shown—the result of a form of sport of very high merit. Though specimens were still wanted for museums, there appeared to be a large amount of unnecessary killing.

Dr. A. S. Woodward commented on the semi-terrestrial habit of the hippopotamus as probably throwing some light on the debated problem of the conditions under which the animal existed in this country in Pleistocene times.

April 3rd, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 20th March, 1924, were read and confirmed.

Mr. Robert Vernon Giffard Woolley and Miss Philippa Chicheley Esdaile, D.Sc. (Manch.), F.Z.S., were admitted Fellows.

The following Certificates were read for Foreign Members; Professor Hans Oscar Juel, Dr. Johannes Schmidt, and Dr. Hans Spemann.

The following were proposed as Fellows: Miss Doris Livingston Mackinnon, D.Sc.; Miss Margaret Brett, M.Sc. (Lond.); and Bernard Cuthbert Ellison, F.R.G.S., C.M.Z.S.

The undernoted were proposed as Auditors for the Treasurer's Accounts for the current financial year ending on the 30th instant, and by show of hands were elected: For the Council—Mr. R. H. Burne and Mr. L. V. Lester-Garland, M.A.; for the Fellows—Mr. H. R. Darlington, M.A., and Mr. H. N. Ridley, M.A.

The President announced that the School Nature Study Union was about to celebrate the 21st anniversary of its foundation, and suggested that the congratulations of the Linnean Society should be offered; this was cordially approved.

Mr. CHARLES TURNER continued the account of his investigations on Desmids, illustrated by a series of lantern-slides (Abstract, p. 69).

Professor F. E. Weiss, F.R.S., and Dr. W. T. Calman, F.R.S., Sec.L.S., contributed further remarks, Mr. Turner replying.

Dr. H. S. HOLDEN then gave an account of his paper "On the Occurrence of Cavity Parenchyma and Tyloses in Ferns," with numerous lantern-slides.

Prof. F. E. Weiss and Mr. J. Ramsbottom, Sec.L.S., raised certain questions, and the author replied.

The third paper was by Dr. H. S. HOLDEN and Miss A. EVELYN CHESTERS, "On the Seedling Anatomy of some species of *Lupinus*."

The President and Miss Prankerd put some questions to the authors, to which Dr. Holden replied.

The last paper was by Mr. W. O. HOWARTH, M.Sc., on "The occurrence and distribution of *Festuca ovina* L., sensu ampliss. Hack. in Britain."

The President commented on the condition of "vivipary" which he had regarded as a response to altitude and corresponding short

season; this was followed by further remarks by Mr. C. V. B. Marquand, M.A., who suggested further breeding experiments in continuance of those made by Jenkin; and Miss M. Rathbone, who had brought plants from Norway, a few seedlings from which viviparous plants resulted. The author replied to the various remarks.

May 1st, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 3rd April, 1924, were read and confirmed.

The Rev. William Charles Tippet and Mr. Cecil Henry Hooper were admitted Fellows.

Certificates in favour of Miss Doris Livingston Mackinnon, D.Sc., Miss Margaret Brett, M.Sc. (Lond.), and Mr. Bernard Cuthbert Ellison, F.R.G.S., C.M.Z.S., were read for the second time.

Miss Dorothy Iva Dawson, Surendra Lal Ghose, Ph.D. (Cantab.), Lieut.-Col. Edwin Harold Brown, I.M.S., M.D., and Frederick Robert Stephen Balfour, J.P., D.L., M.A., were elected Fellows; and Dr. Hans Oscar Jucl, Dr. Hans Spemann, and Dr. Johannes Schmidt were elected Foreign Members.

Mr. Marius Maxwell, Mr. Victor Garner Logan van Someren, L.C.R.P. & S. (Edin. & Glas.), etc., and Mr. George Forrest were proposed as Fellows.

The President read a letter from the Secretary of the School Nature Study Union thanking the Linnean Society for its congratulations upon the attainment of its twenty-first anniversary.

Mr. J. RAMSBOTTOM, Sec. L.S., showed, on behalf of Mr. Edward Clement, seedlings of *Odontoglossum*, *Dendrobium*, *Cattleya*, and *Cymbidium*—both on culture medium in tubes, and potted on—which had been germinated without fungal aid. A series of lantern-slides were shown illustrating the mycorrhiza of orchids and the manner in which the fungus infects the seeds and stimulates germination. The work of Bernard and Knudson in inducing germination by chemical means was outlined. All previous success was gained with seeds which are easily germinated. The present cultures showed that with suitable media, about 90 per cent. of *Odontoglossum* seeds could be got to germinate, and that normal growth continues after transfer from the medium to potting materials. Experiments so far seem to show, however, that *Odontoglossum* is so exacting in its needs that the slightest variation in the composition of the medium is immediately

detected: indeed a medium suitable for the seed of one species may be distinctly out of favour with the seed of an allied species and a modification be necessitated.

The President, Dr. Bateson, and Mr. Dymes commented on the results, and Mr. Ramsbottom replied.

Mr. J. GRAY, of King's College, Cambridge (visitor), gave an address on "Some problems in Experimental Cytology," of which the following is an abstract.

Since 1895 it has been obvious that certain properties of the living cell cannot be satisfactorily studied by means of preserved material, and it is therefore natural to inquire how far it is possible to proceed by means of methods which do not involve any irreversible alteration in its structure. Such work may be conveniently described as experimental cytology.

Some of the main problems of zoology centre round the relationship between the organism and its environment. In order that experimental cytology may attack such problems it is necessary to perform three types of experiments: (a) Each type of cell must be exposed to an environment in which its activities can be carried on without disturbance, and can be completely controlled under laboratory conditions. By varying the environment it is possible to determine those conditions which affect the function and structure of the cells, and at the same time to acquire some knowledge of the mechanism involved. (b) An examination must be made of the normal environment of the cell, in order to determine which factors vary in such a way, as is known from the first series of experiments, as to cause an alteration of structure or of function. (c) An attempt to determine to what extent the activity of one cell can influence others in the organism.

Such an analysis of the ciliated cells in the gills of *Mytilus* indicates that although most of the main constituents of sea-water are intimately connected with the normal conditions, the only factors which vary in such a way as to cause a variation in ciliary activities are the temperature of the sea, and the accumulation of carbon dioxide when the animals are stranded at low tide. The effect of carbon dioxide on the cells is such as to cause an effective guard against the destructive effect of a lack of oxygen.

There are certain problems peculiar to dividing cells which can readily be attacked by experimental methods. For example, it has been suggested that the astral rays are comparable to muscle fibrils, and that by a process of contractions they cleave the cell. Such a view is completely at variance with the fact that the process of cytoplasmic cleavage is unaccompanied by any change in the oxygen consumption of the cells. At the same time there is a steady increase in the rate of oxygen consumption as growth proceeds, although it is not to be associated with any particular phase of nuclear activity. The attempt to investigate the effect of a cell on the structure or activity of neighbouring cells is one of the most difficult in cytology. In some cases there can be no

doubt that the intercellular processes exist, but in the case of *Spirochaeta balhani* there occurs a synchronization of movement of individuals which are only in contact by their anterior end. An inorganic parallel is found in Ostwald's experiments with pieces of chromium exposed to hydrochloric acid. When the strips of metal are in contact they all acquire the same rhythm of evolution of hydrogen.

Most cytological problems can be attacked from more than one point of view, and these views are often difficult to reconcile. To the geneticist the head of the spermatozoid must represent a structure of very great complexity. To the biochemist it is a comparatively simple body. As yet it is probably rash to attempt any comprehensive conception, but at the same time it is possible to avoid the critical speculations which are obviously at variance with facts established by other methods.

Dr. Bateson, F.R.S., began the discussion which followed.

Mr. Cannon (visitor) pointed out that a table displayed by the lecturer gave the effect of varying concentrations of individual ions of sea-water on the functioning of ciliary cells, and that alteration of concentration of any ion altered automatically the concentration of every other ion, and he asked what was the lecturer's method of manipulating ionic concentration. He suggested that the mode of attack should be to find a method of producing variations of ionic concentration such as take place normally, to determine the effect of such variations on the ionic constitution of sea-water, and to show the effect of these changes on activity.

After some remarks by Dr. G. P. Bidder, Prof. R. R. Gates stated that developments in cell study may result from combining the methods of micro-dissection, the study of colloids and the use of the ultra-microscope with observational methods. Observation and experiment must be combined in the study of the cell, as in other branches of biology. The relative simplicity of nucleic acid does not preclude the possibility that chromatin is differentiated. It is possible that the basis of active factors may lie in physical rather than chemical differences in the parts of a chromosome.

Mr. Gray replied to the criticisms and questions which had been propounded.

May 22nd, 1924.

Anniversary Meeting.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 1st May, 1924, were read and confirmed.

Mr. Cecil Norman and Mr. Frederick Robert Stephen Balfour, J.P., D.L., M.A., were admitted Fellows.

Certificates in favour of Marius Maxwell, Victor Gurner Logan van Someren, and George Forrest were read for the second time.

Alister Clavering Hardy, M.A. (Oxon.), and John Clark were proposed as Fellows.

The Treasurer made his Annual Report on the Accounts of the Society, and the Statement (see pp. 32-34), duly audited, was received and adopted.

The General Secretary reported that since the last Anniversary the following had died or their deaths been ascertained, namely :—

16 Fellows.

Dr. Thomas Nelson Annandale.	Thomas Edward Gunn.
Rev. Dr. Joseph Barker.	Walter Thomas Haydon.
Rev. Canon Mark James Barington-Ward.	Henry Edward Houghton.
Dr. Robert Brown.	Dr. William Hatchett Jackson.
Thomas Frederic Cheeseman.	Rev. Digby S. W. Nicholl.
Henry Deane.	Hon. Nathaniel Charles Rothschild.
Rev. Canon William Weekes Fowler.	Colonel Charles Swinhoe.
	Arnold Thomas Watson.
Sir Nicolas Yermoloff.	

6 Foreign Members.

Professor Oscar Hertwig.	Professor Franz Eilhard
Professor Jacques Loeb.	Schulze.
Professor Carl Fredrik Otto Nordstedt.	Professor Johannes Eugenius
	Bülow Warming.
Professor Johan Nordal Fischer Wille.	

That the following 8 Fellows had withdrawn :—

Loftus St. George Byne.	Francis Cecil Hudson.
John Clayton.	Henry Tuke Mennell.
Professor William John Dakin.	Louis Blaise, Vicomte de
Frederick Ambrose Gardiner.	Sibour.
Henry Edward Irving Taylor.	

That the following had been removed from the List of Fellows in accordance with the Bye-Laws, Chap. II. § 6 :—

Dr. Alfred Bishop Hitchens.	Frank Henry Taylor.
Prof. Sadao Yoshida.	

During the same period 36 Fellows have been elected, of whom 30 have qualified up to the present. Also 3 Foreign Members and 2 Associates have been elected.

The Librarian's report was read, showing that donations from private individuals and editors amounted to 134 volumes and 383 pamphlets and parts, by exchange 265 volumes and 1207 detached parts, by purchase 173 volumes and 618 parts; in all, the accessions amounted to 572 volumes and 2208 pamphlets and separate parts. Books bound amounted to 567: 50 in buckram, 330 in half-buckram, 143 in cloth, and 44 rebacked.

The General Secretary having read the Bye-laws governing the Elections, the President opened the business of the day, and the Fellows present proceeded to ballot for the Council and Officers.

The Ballot for the Council having been closed, the President appointed Mr. Edmund Gilbert Baker, Mr. Francis Druce, and Lieut.-Col. J. H. Tull Walsh, Scrutineers, and these, having examined the papers and cast up the votes, reported to the President, who declared the result as follows:—

*Dr. W. BATESON, F.R.S.; Dr. GEORGE P. BIDDER, M.A.; *EDWARD ASHDOWN BUNYARD, Esq.; R. H. BURNE, Esq.; Dr. WM. THOS. CALMAN, F.R.S.; Prof. FELIX E. FRITCH, D.Sc.; *ROBERT W. T. GUNTHER, M.A.; *Miss ANN CRONIN HALKET; Dr. ARTHUR WM. HILL, F.R.S.; *Dr. AUGUSTUS DANIEL IMMS, M.A.; Dr. B. DAYDON JACKSON; L. V. LESTER-GARLAND, M.A.; HORACE W. MONCKTON, F.G.S.; *REGINALD INNES POCOCK, F.R.S.; Capt. JOHN RAMSBOTTOM, M.A.; Dr. A. B. RENDLE, F.R.S.; THOMAS ARCHIBALD SPRAGUE, B.Sc.; R. J. TABOR, B.Sc.; Prof. F. E. WEISS, F.R.S.; and Sir A. SMITH WOODWARD, F.R.S.

(New Councillors are shown by an asterisk. The retiring Councillors were: Prof. E. S. GOODRICH, F.R.S.; Prof. Dame HELEN GWYNNE-VAUGHAN, D.B.E.; Sir SIDNEY F. HARMER, K.B.E., F.R.S.; Lord ROTHSCHILD, F.R.S.; and Dr. E. J. SALISBURY.)

The Ballot for the Officers having been closed, the President appointed the same Scrutineers, who, having examined the ballot papers and cast up the votes, reported to the President, who declared the result as follows:—

President. Dr. ALFRED BARTON RENDLE, F.R.S.

Treasurer. HORACE W. MONCKTON, F.G.S.

Secretaries. Dr. B. DAYDON JACKSON.

Dr. W. T. CALMAN, F.R.S.

JOHN RAMSBOTTOM, O.B.E., M.A.

The President then delivered his Address, on the work of Linnæus in Holland (see p. 35).

TREASURER'S ACCOUNTS FOR THE YEAR ENDED APRIL 30TH, 1924.

(Presented at the Anniversary Meeting, May 22nd, 1924.)

*Receipts and Payments of the Linnean Society from May 1st, 1923, to April 30th, 1924.**General Account.*

	£	s.	d.		£	s.	d.
<i>Receipts.</i>				<i>Payments.</i>			
To Balance at Bankers on 1st May, 1923...	£513	9	3	By Taxes and Insurance	29	13	4
Do. deposits, Fellows'				" Repairs and Furniture	274	3	2
postal account	94	4	2	" Coal, Electric Current, and Gas	104	15	3
Cash in hand	7	4	4	" Salaries	971	18	0
Interest on Investments.....				" Library:—			
" Admission Fees				Books (New Books £26 11 3).....	£275	18	3
" Annual Contributions	£2231	0	0	Binding.....	155	8	3
do. Goodenough Fund...	4	0	0	Expenses of Publications:—			
	2235	0	0	Printing	£843	18	9
Sales of Publications:—				Illustrations	154	16	4
Transactions	£ 31	8	6	Distribution	46	7	5
Journals	239	3	4		1045	2	6
Proceedings and Catalogues	1	16	11		231	14	10
				Miscellaneous Printing and Stationery			
Fellows' postal account, deposits				" Petty Expenses (including Tea and			
Donations in aid of Publications.....	£35	0	0	Postage)	£132	12	7
Transfer from Separate Account (West-				" Fellows' postal account	34	10	7
wood Fund)	9	0	0				
Miscellaneous Receipts				" Linnean Medal	167	3	2
Transfer from Separate Account (Library Catalogue				Transfer to Separate Account	15	10	0
Fund).....				" Zoological Record: Donation for 1922 volume		9	10
				" Balance at Bankers, 30th April, 1924 £407	9	11	
				Do. deposits, Fellows'			
				postal account	69	7	0
				" Cash in hand.....	2	15	1
					479	12	0
					£3776	8	7

Investments on April 30th, 1924.

General Account.

	Value, 1924.		30th April, 1924.	
	£	s. d.	£	s. d.
Forth Bridge Railway 4 per cent. Stock	450	0 0	366	15 0
Metropolitan Consolidated 3 per cent. Stock	1000	0 0	800	0 0
India 3 per cent. Stock	1200	0 0	56	672 0 0
Eastern Bengal Railway 4 per cent. Irredeemable Debenture Stock	1000	0 0	71	710 0 0
Great Western Railway 4 per cent. Debenture Stock	1000	0 0	86	860 0 0
London Midland & Scottish Railway 4 per cent. Preference Stock 1923	312	0 0	82	255 16 10
5 per cent. War Loan, 1929-47	3200	0 0	100 ³	3224 0 0
4 per cent. Victory Bond (transferred from Library Catalogue Fund)	50	0 0	92 ³	46 5 0
				£6934 16 10

Separate Account.

	£		s. d.	
Metropolitan Water Board 3 per cent. "B" Stock (Westwood Fund)	£900	9	5	638 4 5
Ditto				30 0 0
Ditto				100 0 0
New South Wales 3 ¹ / ₂ per cent. Stock, 1930-50 (Trail Award Fund)				300 0 0
2 ¹ / ₂ per cent. Consolidated Stock (Crisp Award Fund)				530 0 0
East India Railway 3 ¹ / ₂ per cent. Debenture Stock (Tagart Fund)	£200	0	0	50 0 0
4 per cent. Victory Bonds.....				50 0 0
				100 0 0
				153 5 8
				421 4 6
				19 16 0
				78 0 0
				171 0 0
				339 4 0
				185 0 0
				92 ³
				1307 10 2

HORACE W. MONCKTON, *Treasurer.*

We have (in conjunction with the Professional Auditor, who certifies as to all details) audited the Accounts of the Society for the year ended 30th April, 1924, and found them correct. We have verified the Investments and Bank Balances.

Dated this 15th May, 1924.

W. B. KEEN, *Chartered Accountant.*

Auditors.
A. B. RENDLE,
H. R. DARLINGTON,
R. H. BURNE,
H. N. RIDLEY,
W. T. CALMAN,
L. V. LESTER-GARLAND.

PRESIDENTIAL ADDRESS, 1924.

At our last Anniversary Meeting you took a step unprecedented in the annals of our Society in making a change in the offices of both zoological and botanical Secretaries and of President. The step was not so rash as it might seem, since the other officers were men who from long and devoted service to the Society might be trusted to keep in check any exceptionally revolutionary tendencies on the part of the new men, who moreover had themselves had some little experience in the conduct of the Society's affairs.

Another unusual circumstance was that the three new men whom you honoured with your confidence were members of the same Institution. While there is perhaps nothing remarkable in the fact that an Institution such as the Natural History Museum should supply a majority of its officers to the Linnean Society, it was merely an accident, and is not likely often to occur. For a precedent we must go back to earlier days, when from 1849 to 1853 Robert Brown occupied the Chair, and his Assistant in the Department of Botany of the British Museum, J. J. Bennett, was the only Secretary. One advantage in the arrangement is that it facilitates consultation between the officers concerned. But the occasion may render desirable a review of the work of Officers and Council during the past year.

Our Treasurer has made his Report. You will agree that it is not unsatisfactory. Our income is larger than it has ever been, and our reserves are wisely invested. But our Treasurer wants to see his way to finance adequately certain changes in the conduct of the Society which your Council has been considering; changes which we might describe as a forward movement. Now, the success of a forward movement depends on the effective co-operation of all concerned, and if, for instance, a larger fellowship is desirable, and there are gaps in our list of Fellows that should be filled, then it is the duty of Fellows to do their best to get them filled.

An important duty of our two honorary Secretaries is the arrangement of the General Meetings, and on your behalf and my own I would thank them for the excellent and varied programme they have arranged for us during the past year. The fortnightly programme is not a haphazard assortment of anything that happens to come to hand, but is carefully considered by your Secretaries, who endeavour to combine subjects of general and special interest for each meeting.

It would be presumption for me to commend to you the work of our General Secretary. Dr. Jackson has served the Society for forty-four years; he is now close on his eightieth year, and it is not to our credit that we should continue to exact the full toll of work. In Edwin Riseley the war took from us a promising young librarian, and since 1917 the post has been vacant. Your Council proposes to fill that post, combining it with that of Assistant-Secretary in the hope that during the years that Dr. Jackson is

able to remain with us the person appointed may cooperate with him and become fitted to assume full responsibility. We have good helpers in our Clerk, Mr. Savage, and Assistant-Librarian, Mr. Warton, but the new appointment should make for increased efficiency, especially in the Library.

We have an excellent Library, and it is an important asset from the point of view of our country Fellows who can only occasionally attend the meetings. We are anxious to make our library increasingly useful to our Fellows, but the number of periodicals, the supply of which must be kept up, continually increases, and it becomes more and more difficult to buy new books. Your Library Committee in making its selection has often to consider what we can do without rather than what we ought to buy. In this connection we have to regret that the response from our Fellows to the formation of a Library Fund for the purchase of the more costly books has been almost negligible, in spite of the generous offer of one of our number to increase the amount raised by ten per cent. The long overdue Catalogue is in the press, and its completion should stimulate our Fellows to a personal interest in the improvement of our Library.

The amount available for publications is what is left when everything else is paid for. In the interests of economy the issue of our *Transactions* still remains in suspense, not without certain regrets. It was the original form of publication by our Society, dating from 1791, and its ample page had a dignity of bearing which is not altogether compensated for by the increased size of the *Journal*; but the greater cost of production as compared with the *Journal* renders it prohibitive at present.

It is chiefly by means of our publications that we serve our overseas Fellows, about one-fourth of our number, though we keep in touch with them by the fortnightly circular which is sent to every Fellow. I have heard it said that our *Journal* is not of sufficient general interest to our Fellows. But our function is not only to publish papers of general interest, but to record facts and deductions; not merely to interest each other, but to advance knowledge. The Linnean Society is one of the chief media for publication of purely systematic papers which are not of great general interest.

In order that overseas Fellows may have the opportunity of nominating Associates, we are now giving sufficiently long notice of vacancies to enable us to receive proposals from any part of the Empire.

Your Council has lately been considering by what, if any, means our Society may be made more efficient. We have important assets—an ideal position as regards locality, a good library, and a fine set of rooms. We are wishful that these may be used to the best advantage of our Fellows. We also desire that the Linnean Society should be fully representative of both Zoology and Botany. We appreciate the difficulty that confronts the young worker of restricted means. The number of Societies representing special

lines of work is increasing, and the young worker is attracted to one or other of these. But it is good for him sometimes to get out of his own rut, and the Linnean Society should afford the wider atmosphere where specialists in different branches may meet together. It is good both for the Society and the specialist that he should come and tell us from time to time what he is doing. The Council which has just relinquished office has discussed at length various suggestions, but has reached no definite conclusions. The new Council will inherit a legacy of problems, to a happy solution of which we may look forward.

At our last Anniversary Meeting we awarded our Gold Medal to Thomas Cheeseman in recognition of his life-long work on the New Zealand flora. To our grief his death was announced early in the new session. Among our Foreign Members our losses have been heavy—on the botanical side, Prof. Nordstedt of Lund, Prof. Warming of Copenhagen, and Prof. Wille of Christiania, and on the zoological side, Prof. Oscar Hertwig of Berlin, Prof. Jacques Loeb of the Rockefeller Institute, New York, and Prof. Schulze of Berlin. Losses among our Ordinary Fellows include Dr. Nelson Annandale, Director of the Zoological Survey of India.

We note with pleasure that our distinguished Foreign Member Prof. the Abbé Vietoire Grégoire of Liège is celebrating the twenty-fifth anniversary of his appointment at the University.

I should like to refer to two events of the past year. For the first time in our history a reigning Sovereign has crossed our threshold. On November 3 our Honorary Fellow, His Majesty King Gustav V of Sweden, with his suite, visited the Society and signed the Roll. He was specially interested in the Herbarium, and portraits, and other objects associated with Linnaeus. The other event which I would mention has been the publication of Dr. Jackson's English Edition of Professor T. M. Fries's *Life of Linnaeus*, a work with which every Fellow of the Society should become acquainted. We have known Linnaeus as a great systematizer, a man of classes, families, genera, and species, but in this volume we get an insight into his methods of work. We botanists are apt to think of him in terms of his herbarium and the *Species Plantarum*, but it was from assiduous study of plants in the field that his System was involved, not moreover as a final arrangement, but to be a temporary convenience for rapid naming and sorting of plants. Dr. Jackson by his *Index to the Linnean Herbarium* (1912) enables us to tell at a glance the contents of the herbarium and to estimate the relative value of the specimens in precisising the descriptions in the *Species Plantarum*, from which our modern nomenclature starts.

The *Species Plantarum* was published in 1753. We learn from the *Life* that Linnaeus began it in 1746, and worked on it night and day until 1748. Then he paused: but a year later he informs his correspondent Bäck that he is again making progress, and in August 1752 he records that he has finished. The book includes

8000 species and many varieties; but if we compare the list of species contained in the Herbarium at the date of publication of the book, we shall find that a proportion only is represented. For this reason, if for no other, we cannot expect to precise all the species described in the book by means of the Herbarium. I do not propose to enter on a critical examination of the Linnean Herbarium from this point of view. If, however, we turn to the Introduction, we find set out in Linnaeus's orderly method the sources upon which he has drawn for information. Several of these are associated with collections which are preserved in the Department of Botany at the British Museum, and to some of these I wish to draw your attention.

First stands the *Hortus Cliffortianus**. There are frequent references to this work in the *Species Plantarum*. In some cases the species is based purely on a reference to *Hort. Cliff.*; there is no description; no synonym is quoted, and there is no specimen in the Linnean Herbarium. It may be of interest to devote a few minutes to the *Hortus Cliffortianus*. Those who are familiar with Linnaeus's life will remember that the turning-point in his career was his visit to Holland, where he arrived in April 1735, ostensibly for the purpose of obtaining a medical diploma. He was twenty-eight years of age, and his life till then had been one of strenuous work, often of poverty, anxiety, and disappointment. In Holland he soon found helpful and influential friends, three of whom stand out conspicuously—Dr. Gronovius, a Leyden senator; Hermann Boerhaave, physician and botanist; and Georg Clifford, Director of the Dutch East India Company, very wealthy and much interested in botany, who had set up an incomparable botanic garden with museum and library at Hartecamp, between Leyden and Haarlem. Here Linnaeus was installed in September 1735, his special charge being the arrangement and enlargement of the Herbarium. His stay with Clifford was interrupted by a visit to England, but on his return he attacked the *Hortus Cliffortianus*, which we are told was written in nine months. The preface is dated July 30, 1737, and on October 7 Linnaeus bade Clifford farewell. His friends, however, did their best to detain him in Holland, and it was not until May 1738 that he finally left, after spending the last two months with Clifford at Hartecamp.

This sumptuous folio volume, which is a memorial of perhaps the happiest and certainly the most productive part of Linnaeus's life, is of peculiar interest. In the first place it was not published at the date which appears on the title-page, which moreover bears no publisher's name. The title-page is dated 1737, but the frontispiece bears the date 1738. Dr. Jackson has found among Sir E. J. Smith's papers, proofs of earlier pages set up in quarto form, indicating that this was the form originally proposed for the work, but it was realized that it would make too unwieldy a

* *HORTUS CLIFFORTIANUS*. Plantas exhibens quas in Hortis tam Vivis quam Siccis, HARTECAMPI in Hollandia, coluit vir nobilissimus & generisissimus GEORGIUS CLIFFORD. Auctore Carolo Linnaeo. Amstelædami, 1737.

volume. An indication of a desire to save time in the printing of the folio work is found in the gap in the numbering of the pages—233 to 300 are missing; this suggests that printing was begun in the middle as well as at the beginning of the volume, and that space had not been accurately calculated. The six copies I have consulted differ in small details of arrangement in the earlier pages, suggesting that the volumes were bound at different times, perhaps as occasion demanded. From various letters (see Sir J. E. Smith's *Correspondence of Linnaeus*, 1821) it is evident that Clifford did not put the book on sale at once, but distributed copies privately. Thus Dr. Gronovius, writing to his English friend Dr. Richard Richardson, Sept. 2, 1738, says: "the *Flora Virginica* . . . will go to press as soon as the *Hortus Cliffortianus* is published, which I expect every day. I shall do my utmost to persuade Mr. Clifford to sell some copies of his *Hortus*." And Dr. Haller of Göttingen writes to Linnaeus (Nov. 24, 1738): "I have not yet received the *Hortus*, which vexes me. I hear it is only to be had as a present from the editor." Later (Jan. 11, 1739), he writes: "Mr. Clifford has sent me his *Hortus*, for which I am obliged to you." However, on Aug. 11, 1739, Gronovius informs Richardson that "Mr. Clifford is not disposed to sell his *Hortus*, but he has so far been persuaded that, of his few remaining copies, he has given some to a fellow who sells them at 28 guilders 10 steyvers." Who the fellow was to whom was entrusted this half-hearted publication of a classic of systematic botany remains a mystery!

Let us pass to Clifford's Herbarium. This is now in the Department of Botany, having been purchased at auction in Holland for £23 in 1791 by Sir Joseph Banks. In the transcript of the Banks Correspondence are letters from his secretary, Jonas Dryander, to Sir Joseph, referring to the purchase, which was arranged through Professor Brugmans of Leiden.

Clifford died in 1760, and we have no definite information as to the fate of the Herbarium in the time intervening before its purchase by Banks. Clifford's son died in 1788, and this may well have been the occasion of the sale of the Herbarium.

There has been some uncertainty as to the relation between the Herbarium and the book. It has been assumed that the plants of the Herbarium are types of the species described in the book; certainly a natural assumption. What is the evidence that the plants are actually those which passed through Linnaeus's hands and on which he based the descriptions in the *Hortus*? It is the general custom of botanists to indicate by writing on the sheet on which the plant is mounted or on a label accompanying the plant the name which they assign to it. The plants in Clifford's Herbarium have been somewhat elaborately mounted in the style prevalent in those days, which represents the specimen growing from an urn, and a somewhat ornate label is attached to each sheet (Pl. 1. fig. 1). Generally speaking, there are two kinds of writing on each sheet—an earlier writing on the label, which gives the

designation of the plant as it was known to pre-Linnean writers, and an obviously later writing on the label or sheet, which gives the binominal assigned to the plant by Linnæus in the *Species Plantarum* sixteen years later (1753), long after Linnæus had returned to Sweden. Neither of these is in the hand of Linnæus. When we bear in mind the speed with which the work was done, we can understand why Linnæus did not trouble by some indication to correlate the plants with the *Hortus*. We remember, too, that even in his own Herbarium, Linnæus only occasionally wrote the name of the plant on the sheet, and was generally satisfied with indicating the number which it bears in the *Species Plantarum*. At the Museum we have had sometimes to warn systematists against assuming that the plants of the Herbarium are types, in the strict modern sense, of the species described in the *Hortus Cliffortianus*; though it is generally possible to correlate the specimen with the description in the *Hortus*, as Linnæus cites the earlier name found on the label. Dryander in a letter to Banks at the time of the purchase expresses his appreciation of the difficulty. He writes as follows, on Oct. 19, 1791:—

“I am sorry to see from Brugmans’s account, that Clifford’s herbarium has not the differentiæ specificæ or other references to *Hortus Cliffortianus*, but still having the names which appear in the *Hort. Cliff.* as synonyms, it is of great value to a critical botanist. It could not be otherwise than that the Herbarium should be older than the *Hort. Cliff.*, but I should have expected from the accuracy of Linné to have written on it references to the *Hortus*. I wish Brugmans* would have informed you how it is with the plants in the *Hort. Cliff.* which have no synonyms, if they are in the Herbarium or not. He says in the letter: les définitions spécifiques ne sont pas de Linné: but if the plants of *Hort. Cliff.* which have no synonyms are in the Herbarium, they must have the diff. spec. of that book or no name at all, which is pretty much the same as if they were not there. For instance, in the genus *Erica*, which interests me so much, the 7th species in H. C. has no synonym†; in the genus *Cassia* are no less than three species, 6, 11 & 12, without synonyms. *Grislea*‡ has no synonym, and is a genus which Linné must have made from Clifford’s herbarium, as it was not in the garden, which is evident from the *Viridarium Cliffortianum*, containing all the plants in the garden; the rest of the plants in the *Hort. Cliff.* were described from the Herbarium. This happens to be a plant one would wish to see if it was the same with the plant Mæster brought under that name. It would be a certain expence to send a man on purpose, and I should think it as likely to raise the price at the sale, if a stranger was to bid for it, as to save anything

* Professor of Botany at Leyden.

† The label bears the name *Erica africana*, and has the number 7 written just beneath it. *Erica caffra* Linn. Sp. Pl. 353 is founded on this.

‡ See next page.

by employing an other person than Prof. Brugmans to bid for it, since you have corresponded with him about it."

Examination of the Herbarium shows that about thirteen sheets of the whole number (3000) bear Linnæus's writing. I will give two examples, which will also serve to illustrate the importance of the Herbarium in precisising the plant described in the *Hortus*. In the *Species Plantarum*, p. 348, Linnæus describes *Grislea secunda* thus: "*Grislea secunda*. Hort. Cliff. 146. Hab. in Am. calidiore ꝑ." There is no specimen in the Linnean Herbarium, and the only means of precisising the species is the reference to *Hort. Cliff.*, where there is a description of six lines, but no reference to any earlier description. In the Herbarium is a specimen, corresponding with the description, below which Linnæus has written the name *Grislea* (Pl. 1. fig. 2). We have therefore the evidence we require that the specimen is the type of *Grislea secunda*, and incidentally of the genus *Grislea* Linn. It is immaterial that this is the plant which Linnæus later described as *Combretum*, and that the name *Grislea* was subsequently assigned to a totally distinct genus*.

In *Spec. Plant.* p. 631, *Browallia americana* is similarly based on "*Hort. Cliff.* 318 †, t. 17." There is also a reference to Linnæus's *Hortus Upsaliensis*, p. 179, published in 1748, which refers back to *Hort. Cliff.*, and there is a plant in the Linnean Herbarium which however was, according to Dr. Jackson's list, not included at the time of the publication of the *Species Plantarum*. In *Hortus Cliffortianus*, as indicated, there is a good description and a figure, and the Herbarium contains the plant written up by Linnæus. Here then we have again an indubitable type both of the genus and species. A peculiar interest attaches to this plant. Linnæus states in *Hort. Cliff.*: "Crescit in America, unde enata in Horto Cheelsejano prope Londinum cura Cl. Milleri, qui raram plantam mecum communicavit." We have also at the Museum another specimen of the same plant from the Chelsea garden dated 1737 and bearing the name "*Dalea* Dni. Millar inventoris" (Pl. 2. fig. 3). Of this Miller says in his *Dictionary of Gardening*, ed. viii. (1768) under *Browallia*:—

"When this plant was first raised in the Chelsea garden, I gave it the title of *Dalea*, in honour to Mr. Dale, a eminent botanist, and a great friend of Mr. Ray's. By this title it was delivered to the Royal Society, and printed in the Philosophical Transactions I, and also in the catalogue of the Chelsea Garden: and by the same I communicated the seeds to Doctor Linnæus, who afterwards changed the name to *Browallia*, and printed it in the catalogue of Mr. Clifford's garden: where there is a figure of it exhibited, so that this latter title is become almost universal among botanists."

* See Rendle, in *Journ. Bot.* 1923, p. 114. † An error for 319.

‡ A Catalogue of the fifty plants from Chelsea Garden, presented to the Royal Society by the Company of Apothecaries for the year 1737, pursuant to the direction of Sir Hans Sloane, Bart. By Isaac Rand, F.R.S. Hort. Chel. Præf. Phil. Trans. vol. xli. p. 1 (1744).

On a later page in, the *Hort. Cliff.*, 363, Linnæus gives the name *Dalea* to another plant which he had received from Miller, and also figures it (tab. 22). Linnæus did not, however, retain the genus, but in *Spec. Plant.* 764 transfers it to his genus *Psoralea*, under the name *Psoralea Dalea*, and later Miller (*Dict.* ed. 8. *Psoralea* no. 6) renames it *Psoralea annua*. There is no doubt as to the identity of the plant in Clifford's Herbarium, though it bears only the later name *Psoralea Dalea*. The companion plant in Miller's Herbarium bears a note by Dryander: "This is really *P. Dalea*, as appears from the *Hort. Clifford.* and Linné has a wrong plant in his herb. It was sent by Miller to the garden at Hartecamp."

The genus *Dalea* is regarded by modern systematists as distinct from *Psoralea*.

These and similar cases are sufficient to establish an intimate relation between Clifford's Herbarium and the *Hortus Cliffortianus*; and though the correlation of the specimens with the book is not always clear, we are justified in regarding the Herbarium as the one which supplied the material for the volume.

The book is a record of the plants in Clifford's garden as well as of the Herbarium, but we know that Linnæus was busied during the period of his residence at Hartecamp in preparing the plants of the garden for preservation in the Herbarium.

As regards the writing on the labels in the Herbarium, I think we may assume that the earlier writing on the label was in most cases that which the plant bore when it passed through Linnæus's hands, and that the later binominal was added, we do not know by whom, soon after the publication of the *Species Plantarum*, at any rate before Clifford's death in 1760.

Another work of reference used by Linnæus in compiling the *Species Plantarum* was his *Flora Zeylanica*, published at Stockholm in 1747. This was a descriptive account, arranged according to his own system, of an herbarium of Ceylon plants collected by Paul Hermann, Professor of Botany at Leyden, in the island, 1660-1677. This herbarium had several owners, and was for a time lent to Linnæus (1744); it was ultimately acquired by Banks. A full account of the work was given by the late Henry Trimen in our own *Journal* (*Journ. Linn. Soc.* xxiv. p. 129). The Herbarium is specially interesting from the unusually careful manner in which Linnæus has correlated the specimens with his *Flora Zeylanica*, by writing beneath the plant the name or serial number which it bears in the enumeration (Pl. 2. fig. 4). A number of these specimens are types of the species described in the *Species Plantarum*.

Certain North American species in the *Spec. Plant.* are based on references to Gronovius, *Flora Virginica*, in which are described plants collected by John Clayton in Virginia. Gronovius was working on this book, as we have already seen, during Linnæus's stay in Holland; it was published at Leyden in 1739. The collection was purchased by Banks from the Earl of Bute in 1794. In one of his useful Bibliographical Notes in the *Journal of*

Botany (1898, p. 264) Mr. Britten has emphasised the importance of Clayton's plants as types of many Linnean species.

A work frequently quoted by Linnaeus is Leonard Plukenet's *Phytographia* (1691-2); he refers to it in the *Hort. Cliff.* under the Bibliotheca as "opus incomparabile" and "iconographi usitatissimi." Certain species in *Species Plantarum* are founded on the descriptions and illustrations in Plukenet; the corresponding specimens are in Plukenet's herbarium, which however Linnaeus had no opportunity of studying. Plukenet's Herbarium was acquired by Sloane, and occupies several volumes in the Sloane Herbarium.

The Sloane Herbarium is of great importance as a means of precisising certain of Linnaeus's species; especially the collections made by Sloane himself in Jamaica on which his account of the Natural History of Jamaica is based. When in London, Linnaeus visited Sir Hans Sloane and saw the Herbarium, but had no opportunity of studying the material. But in his description of New World species the description and figure in Sloane's *Natural History of Jamaica* are frequently cited, and the originals of these can readily be referred to in the Sloane Herbarium at the Museum. My former colleague, Mr. James Britten, has been engaged for some time on the preparation of a Catalogue of this valuable Herbarium, and we hope that he may soon find time to complete it*.

SIR E. RAY LANKESTER, K.C.B., then moved: "That the President be thanked for his excellent address, and that he be requested to allow it to be printed and circulated amongst the Fellows," which, after being seconded by Dr. J. RUDD LEESON, was put and carried by acclamation.

The President, having acknowledged the vote of thanks, then proceeded to address Professor WILLIAM CARMICHAEL MCINTOSH, F.R.S.:—

Professor MCINTOSH,—

In awarding to you the Linnean Medal the Council of the Linnean Society wishes to mark especially its admiration for the single-hearted devotion and unremitting industry with which, throughout your long career, you have laboured in the study of the animal inhabitants of the sea. It would be impossible for me to mention here even the more important of the long series of memoirs in which you have extended our knowledge of the marine fauna, nor is it necessary, for some of them, at least, are known to every zoologist; but we should like to congratulate you on the recent completion of your stately 'Monograph of the British Marine Annelids,' a group of animals on which you have been, for longer than most of us can remember, the foremost authority. You were a pioneer, I might almost say the pioneer,

* In the interval between reading and publication I regret that my old friend and colleague has passed away.

of scientific research on fishery problems in this country, and the work of yourself and your pupils in this department is recognized as fundamental. There is abundant evidence of the high estimation in which you are held in the international community of scientific men, but we think it especially fitting that your eminence in the fields of systematic and faunistic zoology should be recognized by an award associated with the name of the Swedish master of taxonomy.

One of your earliest papers was communicated to this Society no fewer than sixty-two years ago, and to-day you stand second in order of seniority on the list of our Fellows*; but we are glad to know that you continue to work with unabated energy and undiminished enthusiasm, and we hope to read many further contributions from your pen.

Professor McIntosh: Mr. President, I have to acknowledge, with many thanks, the great honour, Sir, which you and the Council of the Society have thought fit to confer on me, and this I do with the greater zest since, so far as I know, I am the first Scottish zoologist who has received this mark of esteem from the Society. It is true my valued teacher and old friend Prof. Allman held a Chair in a Scottish university for fifteen years, but he had reached middle life before he left his native country—Ireland. The Scottish botanists have been more fortunate—Sir George King, and Isaac Bayley Balfour.

It is fully sixty-one years since I became a Fellow of the Linnean Society, though even before 1863 a paper of mine had been published by the Society. Mr. Bentham was then President, and my esteemed and life-long friend Prof. G. Busk, Secretary. During all that period the Library of the Society has been of infinite help, and it contains many unique works, such as the MS. work of Col. Montagu, illustrated with the fine original coloured drawings from life by his niece Miss E. Dorville, some of whose stippled figures of marine animals have only been equalled by those of the late Mrs. Günther (the mother of an active and well-known member of the Society), whose beautiful figures of Polychæta are now in the British Museum. To the Society, on this head alone, I owe a deep debt—a debt which is now increased by your generous words and the kindness of the Council.

Besides the more purely scientific benefits received from the Linnean Society, it may not be known to any here that I am indebted for opportune help in another field. It may be that a few remember the great Fisheries Exhibition of 1883, at which Prof. Huxley and Lord Eversley first promulgated their entire confidence in the powers of "Nature" being able in the open sea to withstand all the destructive agencies of man. Well, to this exhibition I had sent a series of fish-preparations and many of Mrs. Günther's original coloured drawings, and when arranging

* Older member Sir J. T. Dillwyn Llewellyn, Bart., M.A. (Oxon.), V.M.H.

these the day before the opening ceremony by the Prince and Princess of Wales (afterwards King Edward and Queen Alexandra), I was interrupted by Dr. Day, the ichthyologist, who, rushing into the compartment, demanded to know if I wished a whale. The reply was—that depended on its size. I accompanied him to another department, where a metal case had just been opened, with the result that the entire gallery was filled with a disagreeable and penetrating odour, so that Sir Ed. Birkbeck had ordered the instant removal of the offensive case, and hence the haste of Dr. Day. I found the case contained a finely-preserved example of a female Gangetic dolphin, but the reddish liquid (arrack) in which it was immersed gave off the pungent and penetrating odour. A cab was immediately got, the case placed on the roof, and a start made for the Linnean Society, where my old friend Dr. Murie then was. The jolting on the way to and in Piccadilly, however, caused the deep red liquid to run down the sides of the cab and drip like blood on the stones. The police had all along eyed the cab with grave suspicion, and at last it was stopped by a policeman at Burlington House, who demanded to know what was in that long wooden box on the top. As I was stepping out of the cab Dr. Murie came out of the gate, and between us we satisfied the police. The case was placed in the cellar of the Linnean Society, soldered up, and by-and-by carried northward to the University Museum, St. Andrews, along with many other fine specimens from India and Australia.

Permit me once more to express my sincere thanks for the great honour, Sir, you and the Council of the Society have bestowed on me.

The General Secretary placed the obituaries prepared for the Anniversary upon the table, and the proceedings closed.

OBITUARY NOTICES.

Dr. THOMAS NELSON ANNANDALE, the eldest son of Prof. Thomas Annandale, F.R.C.S., was born at Edinburgh in 1876, educated at Rugby, Edinburgh University, and Balliol College, Oxford. After graduating he travelled in the Malay Peninsula in 1899-1902, was appointed Deputy Superintendent of the Indian Museum in 1904, afterwards, in 1906, becoming Superintendent. Besides many papers on zoological and anthropological subjects, he published 'The Faroes and Iceland: studies in Island Life,' 1905; 'Fasciculi Malavenses,' 1903; he also investigated the fauna of the Sea of Galilee in Palestine during 1912. Elected a Fellow of our Society on the 5th December, 1907, but owing to his continuous residence in Calcutta, he was not formally admitted until the 17th March, 1921; in that year a paper by our Dr. Annandale was read by a colleague, Major Sewell, the author being prevented

by an attack of illness from presenting the paper in person. It was entitled "The Vegetation of an island in Chilka Lake on the east coast of India, considered as a preliminary to a study of the fauna": an abstract was published in our 'Proceedings,' 133rd Session, 1920-21, page 63.

Dr. Annandale graduated B.A. at Oxford, D.Sc. at Edinburgh, obtained the C.I.E. so recently as 1923, and died at Calcutta on the 10th April, 1924. [B. D. J.]

The death of WILLIAM BARCLAY on the 10th May, 1923, exactly one week after his election as an Associate, was as tragic as it was unexpected. Born at Tulloch, near Perth, on the 19th March, 1846, he was educated in Perth, and selecting teaching as his profession, he proceeded to the Church of Scotland Training College in Edinburgh. After completing his training, he passed to schools at Glenrinnies, Watergate School at Perth, and in 1884 became head master of the new Western District School, where he remained till his retirement in 1911.

His residence in Perth brought him in contact with Dr. Buchanan White, the Perthshire Society of Natural Science being founded in 1867, the outcome being 'The Flora of Perthshire' in 1898. Barclay was intimately associated with White and Prof. Trail in collecting material and preparing it for publication. He was President of the Society for eleven years, retiring in 1918: six years before, he had printed an account of additions to the Perthshire flora since Buchanan White's flora; he had added *Poa palustris* to the British flora from the River Tay below Perth in 1899, and in 1915 he discovered the hybrid *Potamogeton venustus* Baagoe for the first time in Britain. Distribution was, however, his great delight, and the genus *Rosa* his chief study. His election as Associate of the Linnean Society took place on the 3rd May, 1923; a letter informing him of the fact was sent to him the same day, and a reply conveying his keen pleasure in the distinction was received a few days afterwards, but the writer was dead when that letter was read in the next Council. [B. D. J.]

Canon MARK JAMES BARRINGTON-WARD died suddenly at Duloe Rectory on the 4th February, 1924, at the age of 80.

The second son of Mark Barrington-Ward of Belfast, he received his early education in that city and at the Royal School, Dungannon, going up to Queen's College, Belfast, and afterwards matriculated at Worcester College, Oxford, in 1865, migrating two years later with a scholarship to Magdalen Hall, now known as Hertford College. He graduated B.A. in 1869, the year following his election as a Fellow in our Society in January 1868. After taking his degree in 1869, he became a master at Clifton, when Dr. John Percival, afterwards Bishop of Hereford, was head master. Having again become a member of Worcester College, he proceeded M.A. in 1872, and was appointed an inspector of schools from a post in the Middle Temple. In 1907

he quitted this position, and was ordained by the Bishop of Worcester, Yeatman Biggs, to the curacy of Tything, Worcester; in 1909 he removed to the Rectory of Dunloe. In 1919 he was made an honorary canon of Truro. He married in 1879 Caroline Pearson, and had five sons and four daughters. Besides his ecclesiastical work, he was greatly interested in gardening, and was the author of several geographical books. [B. D. J.]

THOMAS FREDERIC CHEESEMAM was born in Hull, Yorkshire, in 1846, was taken by his parents to New Zealand in 1854, and was educated first at the Parnell Grammar School and afterwards at St. John's College, Auckland. His father, the Rev. Thomas Cheeseman, was prominent in the public life of the day, and at one time a member of the old Auckland Provincial Council.

Cheeseman probably began a serious study of the New Zealand flora from Hooker's 'Handbook,' together with the founding of the New Zealand Institute; at all events, by 1872 he was well acquainted with the plants of his neighbourhood, and published an accurate account of the flora of the Waitakarei Hills, still of interest, as the sole record of a vegetation since profoundly modified.

In 1874 Cheeseman was appointed Secretary of the Auckland Institute and Curator of the Museum, then in its infancy. This appointment had far-reaching effects not only in gathering together collections for the museum, but in all-round studies of a naturalist. Thus, though primarily a botanist, he wrote 22 papers on geological or ethnological subjects out of a total of 101.

Nor was his investigation confined to New Zealand objects. A flora of Rarotonga from his pen was published in our 'Transactions,' Second Series, vol. iv. pp. 261-313, pls. 31-35, in 1903.

The death of Thomas Kirk in 1897 interrupted the 'Students' Flora of New Zealand': the half-finished volume was printed by the Government in 1899, Mr. Cheeseman being commissioned in the following year to draw up a complete flora of the Dominion; at the same time he was released from the duties as Curator of the Auckland Museum. His researches had begun in 1870, embracing the whole region from the Kermadec Islands and the North Cape to Otago. The result appeared in 1906, entitled 'Manual of the New Zealand Flora,' and regarded by all who have used it as one of the best local floras in existence. This handbook being completed, its author turned to compiling a series of plates in illustration, selected by Mr. Cheeseman, but drawn and printed in England; the artist was Miss Matilda Smith, the proofs approved by Mr. W. Botting Hemsley, F.R.S., worked off and despatched to New Zealand, where the text was printed, and the book published at Wellington in two handsome volumes.

At the last Anniversary Meeting of the Linnean Society the Society's Gold Medal was awarded to him, and received on his behalf by the High Commissioner. Letters thanking the Society for the award were received in due course, unhappily

followed by the news that his death had taken place on the 15th October last unexpectedly, although he was known to be far from strong. Of the proof of his revised flora he had read to the end of the Monocotyledons.

For years he had worked alone without a botanical companion, his knowledge being entirely due to reading and observation. He was gifted with amazing patience, sound judgment, and calm common sense; gentle and lovable, he had a quiet sense of humour, betrayed by the twinkle in his eye. He had been a Fellow of the Linnean Society since 1873. [B. D. J.]

HENRY DEANE, who died at Malvern, Victoria, on the 12th March, 1924, was the son of Henry Deane (1807-1874) of Clapham, a noted pharmaceutical chemist, the first President of the British Pharmaceutical Conference and a Fellow of the Linnean Society of London from 1855 till his death, who was one of the founders of the Microscopical Society. Amongst the schoolfellows of Henry Deane, senior, were Henry and Edwin Doubleday, afterwards the distinguished entomologists, who communicated their love of collecting birds and insects to Mr. Deane, whose interest in natural history, thus aroused, never waned. He was a personal friend of A. R. Wallace and others of the same time, and received from Dr. Harvey (who visited Australia to collect seaweeds, wrote a book on them and distributed sets of seaweeds) a set which Henry Deane, junior, inherited. This set he presented, together with his own private herbarium, chiefly of New South Wales plants, to the National Herbarium in Sydney only some four years ago.

Thus it was the example and influence of his father that aroused the interest in natural history of the Henry Deane just lately deceased. Before he came to Australia, he collected and studied British insects, but in Australia, in his leisure hours, he specialised in botany.

Henry Deane was born at Clapham, London, on the 26th March, 1847. In 1862. he matriculated at Queen's College, Galway, which was connected with the Queen's University in Ireland (since merged into the Royal University), and in 1865 he obtained the degree of B.A. at the said University, taking second-class honours in both mathematical and natural sciences. The degree of M.A. was subsequently conferred upon him, as was also, in later years, the *ad eundem* Degree of M.A. by the Senate of the Sydney University. Mr. Deane completed the second year's course in engineering, but took the balance of the subjects required for the Diploma at King's College, London.

In 1867 Mr. Deane entered the office of the late Sir John Fowler—then Mr. John Fowler—in Westminster, as a pupil of the late Mr. T. Marr Johnson, who was then associated with Mr. Fowler in the construction of the Metropolitan and Metropolitan District Railways, and part of the work consisted of bringing the broad-gauge Great Western Railway into the City

of London. A large amount of mixed gauge or third rail was thereby involved. This period comprised two years. The next two years he was engaged with Waring Bros., the concessionaires and contractors of the East Hungarian Railways (Transylvania). In 1871 he obtained the appointment of Chief Technical Assistant to the Head Manager and Engineer-in-Chief at the shipbuilding works of the Danube Steam Navigation Company at Altofen, Hungary, where from 1600 to 2000 men were employed. Here he spent three and a half years, after which he returned to London. From 1875 to 1879 he was engaged on engineering surveys and work, part of the time being spent in the office of Sir John Fowler on bridge design, immediately under the direction of the late Sir Benjamin Baker, the author of the world-famed Forth Bridge, and during the latter part of the time visited the Philippine Islands in connection with the erection of sugar works (Sir Robert Tooth's). In June 1879 he returned to England somewhat broken down in health, and determined to try his fortune in Australia.

In November 1879 Mr. Deane left England by the S.S. 'Kent,' of the Money Wigram Line, and arrived in Sydney on the 8th January, 1880. Shortly after his arrival in Australia an appointment as Surveyor in the Railways Construction Branch of New South Wales was offered to him by Mr. John Whitton, then Engineer-in-Chief for Railways, which he accepted, and from that time on to the end of May 1889 he filled the positions successively of Railway Surveyor, Supervising Engineer over Construction, Acting Engineer-in-Charge of Surveys, Acting Inspecting Engineer and Chief Assistant to the Engineer-in-Chief. It was during the latter appointment that the Hawkesbury Bridge was built. On the 1st June, 1889, Mr. Whitton went on leave for an extended period, and Mr. Deane was appointed Acting Engineer-in-Chief, a position which was followed subsequently by the full appointment of Engineer-in-Chief. His duties were made to include the charge of tramway construction as well as railways.

The late Mr. Eddy, who under the New Railway Act had been recently appointed Chief Commissioner for Railways, took Mr. Deane into conference with a view to taking steps to improve the running of the railways by reducing curvature and gradients, abolishing the zigzags on the western line, and in duplication generally. The first works of this character were carried out under Mr. Deane's supervision, or with the assistance of some of his staff, who were loaned to the Commissioners for the purpose. In the year 1894 Mr. Deane was commissioned to make a trip round the world to study the question of the construction of light railway and tramways. The visit lasted eight months, and much valuable information was obtained to enable him to start a system of cheap or pioneer lines new to Australia, and also to inaugurate, with the cooperation of the late Mr. Elwell, the electric tramway system of Sydney.

In 1904 the work of railway construction being exceedingly slack in New South Wales, owing to commercial depression, Mr. Deane was commissioned to make another trip through America, Great Britain, and Europe, for the purpose of gaining information useful to the department. He left Sydney in April of that year, and was thirteen months away. On Mr. Deane's return he furnished certain reports, but the financial position not having been much improved, arrangements were made by which Mr. Deane could take his final leave prior to retirement, and he thus terminated his active connection with the Government of New South Wales at the end of May 1906.

It was about this time that it was decided, after conferences between the Governments and the Railway Commissioners of the four States—of Queensland, New South Wales, Victoria, and South Australia—to appoint a Consulting and Inspecting Engineer in London to represent the above-mentioned four States jointly. Mr. Cecil W. Darley, who had been acting for New South Wales, would probably have had the refusal of the appointment, but he was very anxious to resign. The position was offered to Mr. Deane, and a notice of appointment appeared in the Sydney Government Gazette in February 1906, but the terms offered were not acceptable, and the matter remained in abeyance. Before, however, matters were finally determined, Mr. Deane accepted an appointment with the Commonwealth Oil Corporation to build and work a railway to their mines in the Wolgan Valley, junctioning with the western line at the further end of the Blue Mountains (Newnes Junction). This line, 32 miles long, the further part of which was made through steep and rugged country, involving grades and curves steeper and sharper than any made in Australia, was successfully completed. Special engines, called "Shay" locomotives, capable of negotiating such grades and curves, were imported from the Lima Locomotive Co., of U.S.A., to work this line. (Other of these engines were imported later on for use on the Dorrigo, N.S.W., but it was Mr. Deane who introduced them to Australia.)

Mr. Deane had opened an office in Sydney, and practised there as Consulting Engineer. In 1908 and 1909 he assisted the Commonwealth Government in the matter of the Kalgoorlie-Port Augusta Railway Survey, and in 1911 he took charge of the office newly formed for the purpose of the preparation of plans and estimates for the information of Parliament during the passing of the Kalgoorlie-Port Augusta Railway Bill. In the beginning of 1912 Mr. Deane accepted the position of Engineer-in-Chief, which office he held until his resignation in February 1914. He, however, did not relinquish the position for some weeks later, when he had initiated his successor into the work.

Mr. Deane was elected an Associate Member of the Institution of Civil Engineers in 1874, and has thus for 50 years enjoyed the privilege of a corporate member. He was transferred to the Class of Member in 1886. When the Council of the Institution

in Westminster decided in favour of representation in different parts of the Empire, Mr. Deane was the first to be appointed member of the Council for Australasia. Mr. Deane was a member of the Institution of Surveyors, New South Wales Incorporated, a Society which includes fully-qualified surveyors only, and was one of the early Presidents of that body.

As the result of Mr. Deane's tour through North America, Great Britain, and Europe in 1904-5, he came in touch with the most up-to-date methods in engineering. Mr. Deane, as before mentioned, was instrumental in introducing the "Shay" locomotive for steep grades and sharp curves; the track-layers, used in the construction of the trans-Australian Railways, were adopted by the Minister at the suggestion of Mr. Deane. Mr. Deane was very anxious that the New South Wales Government should lay down a system of light railway lines to connect the country districts, these places to be served by small one-car "mixed" trains driven by internal combustion engines. (This method of motor-trains has only recently been adopted in N.S.W.) Mr. Deane was a keen advocate for the Unification of the Gauges of the Australian Railways, and was a firm believer in the use of the Third Rail during the period of transition.

Mr. Deane's interests in science were wide. He was twice elected President of the Royal Society of New South Wales (1897 and 1907), and for many years he had a seat on the Council. He was two years President of the Linnean Society of New South Wales (1895 and 1896), and one of his presidential addresses was on the subject of Forestry. During his life in Australia he made a special study of the native timbers, especially eucalypts. The botanical side of the latter was taken up with Mr. J. H. Maiden, F.L.S., Govt. Botanist and Director of the Botanic Gardens, Sydney, and a series of papers on this subject was read before the meetings and published in the 'Proceedings' of the Linnean Society of New South Wales.

From an Obituary Notice in the Proceedings of the Linnean Society of New South Wales.

"Mr. Deane became a member of this Society in 1883, and until his removal to Melbourne was a very active member of the Society, being a regular attendant at the meetings and a frequent exhibitor of interesting specimens. He was a member of Council from 1887 to 1912 and was President for the years 1895-96 and 1896-97.

"During the years 1895-1901 he contributed fourteen papers, nine of them in conjunction with Mr. J. H. Maiden, to the 'Proceedings,' amongst them being a series of eight papers containing observations on the Eucalypts of New South Wales. Before the appointment of Mr. Maiden to the Botanic Gardens, he was in close touch with such eminent botanists as Dr. Woolls, Mr. Fitzgerald, and Baron von Mueller. He was an accomplished

botanist, and, apart from his work on present-day plants, he had carried out much work on the Tertiary fossil flora of Western Australia—a most difficult subject to deal with satisfactorily. Some of the results of these fossil studies were published by the Geological Survey of New South Wales, and they form a valuable contribution to our knowledge of the flora which preceded the existing flora in Australia.

“Although living in Melbourne for the last twelve years, he retained his interest in the Society and its doings, and it was rarely that he did not find time, on his visits to Sydney, to look in at the Society’s headquarters. His death removes one who took a keen interest in the Society’s affairs and who helped to guide the destinies of the Society for a quarter of a century.”

While living at Gladesville (1883-1890), then a rural suburb of Sydney, Mr. Deane had ample opportunity to pursue his botanical studies and research. He has since often spoken of the beautiful bush which at that time surrounded the place, and of the remarkable number and variety of the native flora found there. Orchids were particularly in abundance, and it was near this district that the late Robert David Fitzgerald lived (Hunter’s Hill), and from which he, no doubt, obtained his local specimens. As is known to all botanists, Mr. Fitzgerald collected plants and amassed a vast amount of information concerning the family of Orchids, making careful artistic delineations of each plant. In this work he was ably assisted by Mr. A. J. Stopps, of the N.S.W. Lands Department. Mr. Fitzgerald’s offer of this valuable collection to the N.S. Wales Government being accepted, the work was published by the Government Printer, No. 1 of the seven parts of the first volume appearing in July 1875. Up to March 1888 four parts of volume 2 has been issued as well as the complete volume 1. Fitzgerald’s work on orchids and the part which Henry Deane played in the publication of the last volume (Vol. 2, Part 5), is summarised by the late Dr. James Norton in his preface to that number. Dr. Norton tells of Mr. Fitzgerald’s death in August 1892, and of his “leaving a large number of finished or partially finished drawings and some notes connected with them, but unfortunately these notes were in most cases only fragmentary, and in no case in a state fit for publication:

“The work done being too valuable to be allowed to be lost, the Government consented to continue the publication as heretofore, and, a sum of money having been granted for that purpose, it was arranged that Mr. Stopps should transfer to stone such of the drawings as had not already been dealt with, and that Mr. Henry Deane, M.A., F.L.S., Engineer-in-chief of Railways, who was no mean botanist and had devoted a large portion of his leisure to the study of the Orchidaceæ, was induced to undertake the duty of preparing the necessary letterpress, using such notes as had been left by Mr. Fitzgerald, and supplementing these from his own valuable experience and observations.”

The publication of this Part 5 was due to the representations

made to the Government by Doctor the Hon. James Norton, M.L.C., and Mr. Deane. No further numbers of this valuable work have been issued—a source of great regret to Mr. Deane as well as to all botanists.

Mr. Frederick Chapman, A.L.S., Paleontologist, Natural History Museum, Melbourne, writes:—

“Although for a long time familiar with Mr. Deane’s writings on paleobotany, or ancient floras, especially those of Cainozoic age, I had only within more recent years made his personal acquaintance, which, as was natural with so genial a man, ripened into friendship. No one in Australia, it is safe to say, was so well equipped for the work on fossil botany which he had undertaken many years ago; for he had made a particular study of the leaf form and venation of our living Australian flora. At the time of his decease, Mr. Deane was engaged on a valuable line of research in regard to the correlation of the fruits of the Deep Leads with those of living plants; and his conclusions, which I learned from frequent consultations with him, went much farther than Baron von Mueller’s, who first described them. There is now in the press a valuable monograph of the leaves of the Norwell Brown coal, which will show that, even at the advanced age of 77, his right hand had not forsaken its cunning. Amongst Mr. Deane’s valuable results may be numbered the two papers published by the Linnean Society of New South Wales in 1900, which critically examined Ettingshausen’s conclusions regarding the existence of Old World types in Australian floras. From one who numbered such men as Alfred Russel Wallace amongst his early friends, much helpful information would often be obtained, and the writer, along with others, could always discuss subjects of paleobotanical interest with profit to himself.”

In his spare time in the early part of this century Mr. Deane prepared papers for the Department of Mines, Sydney, the Victorian Geological Survey, and the Trustees of the Melbourne Library, which have been published. Mr. Deane had been a Fellow of the Royal Meteorological Society of London for over sixty years, he having joined the Society at the age of sixteen; and had been an “Observer” both in Sydney and Melbourne, sending in reports to the Weather Bureaux of those places. Mr. Deane was a Fellow of the Linnean Society of London since 1886, and also a Fellow of the Royal Horticultural Society, London. Settling in Victoria in 1912, Mr. Deane became in 1914 a member of the Royal Society of Victoria. He took an active interest in the Australian Forestry League and was a member of the Council.

For many years horticulture had been Mr. Deane’s chief outdoor hobby, and he was very successful in growing flowers. His last earthly look was on the garden he loved so well.

Mr. Deane was twice married, and leaves a widow, three sons, and three daughters. His two elder sons follow in his engineering and scientific footsteps:—Henry James is Chief Assistant

Engineer to the Port of London Authority; Cedric holds a position in the Electrical Department of the Victorian Railways. The youngest son, Geoffrey, is with the firm of Messrs. Dalgety & Co. Ltd. [M. E. DEANE.]

CANON WILLIAM WEEKES FOWLER, M.A., D.Sc., Vicar of Earley, a suburb of Reading, died with startling suddenness on Sunday, 3rd June, 1923, at the age of 74. He had taken the 8 o'clock service, and seemed to be in his usual good health. Shortly before 11 o'clock, he walked over from the vicarage, and spoke cheerfully to some of his congregation. The choir was about to pass into the church, when the vicar fell back, and was caught by a choirman, and a doctor was sent for, on whose arrival life was pronounced extinct. Meanwhile the curate had begun the service, who, at the end of the Benedictus, announced that the vicar had been taken ill, and the service was stopped.

Canon Fowler was the son of the Rev. Hugh Fowler, of Barnwood, Gloucester, and was born in January 1849. He was educated at Rugby, and gained a scholarship for Jesus College, Oxford. He took a first in Classical Moderations and a third in Literæ Humaniores; after ordination he became a house master at Repton in 1873; in 1880 he was elected head master of Lincoln School, where he remained for more than twenty years. Bishop King appointed him Canon of Welton Brinkhill in Lincoln Cathedral. From 1901 to 1904 he was Rector of Rotherfield Peppard, Oxfordshire, and in 1905 he became Vicar of Earley.

In scientific circles he was best known as an entomologist, being a sub-editor of the 'Entomologists' Monthly Magazine' from 1885 to the time of his death. He was secretary of the Entomological Society in 1886-1896, and president in 1901-02. His chief works were the volumes on Coleoptera for the 'Fauna of British India,' in 1902, on Hemiptera Homoptera in conjunction with W. L. Distant in Godman and Salvin's 'Biologia Centrali-Americana,' in 1887-1909; with D. Sharp a 'Catalogue of British Coleoptera,' in 1893, and the 'Coleoptera of the British Isles,' in five volumes, in 1887-1891; and a supplementary volume with Mr. H. St. J. K. Donisthorpe, which came out in 1913. His text-books on the classics for school use do not concern us here.

Elected a Fellow of the Linnean Society 7th November, 1878, he served on its Council in 1906-07, but since the last date he was hardly ever seen in the Society's rooms. Interested in gardening, he was a valued member of the scientific committee of the Royal Horticultural Society. His death leaves a blank in many circles, which will not easily be filled. [B. D. J.]

DR. WILLIAM HATCHETT JACKSON, D.Sc., Radcliffe's Librarian at Oxford and sub-warden of Keble College, died on the 21st February, 1924, at Weston-super-Mare, of syncope following influenza, in his 76th year.

He was the eldest son of the Rev. William Jackson, of Exeter, where he was born in 1849, and entered as an undergraduate at New College, studied under Prof. Rolleston, was placed in the first class in the Final Honours School in 1873, and became assistant to his teacher and professor of comparative anatomy and physiology. When Henry Moseley succeeded as Linacre Professor, Jackson was disappointed, but having private means, he remained at Oxford, and became Tutor of Keble College. He was an energetic teacher, with a wide knowledge of the literature of his subject, and many of his pupils attained distinction in after-life. His best-known work was his 'Forms of Animal Life,' an erudite and original work based upon a small book by Rolleston.

After Moseley's death in 1891 and pending Ray Lankester's appointment, Jackson acted as temporary professor. Soon afterwards he was gratified by his appointment as Radcliffe's Librarian, for which post he was eminently fitted. He took the degree of Doctor in Natural Science in 1900, and was elected a Fellow of the Linnean Society on 20th April, 1871; but his only contribution to our publications were "Sex in Chrysalids," printed in our 'Transactions,' 2nd Series, vol. v. pp. 143-186, in 1890, and an exhibition of *Geophilus electricus* from Oxford on 19th December, 1889. [B. D. J.]

Dr. JACQUES LOEB was born in Germany on the 7th April, 1859, and educated in Berlin, Munich, and Strassburg universities; he took his M.D. degree, and received the honorary degrees of Sc.D. at Cambridge and Ph.D. at Leipzig. After acting as assistant professor in Würzburg, and afterwards in a similar capacity at Strassburg, in 1890 he emigrated to the United States, married Anne L. Leonard in that year, and became Associate Professor of Biology at Bryn Mawr, Pennsylvania, 1891-92; Chicago, 1892-1900; and Professor of Physiology at California University, 1903-1910. He was elected Foreign Member of the Linnean Society 6th May, 1915, and died on the 12th February, 1924.

During his scientific career he was a prolific author, amongst his productions being 'Animal Heliotropism,' 1890; 'Physiology and Morphology' in two parts—part i. 'Heteromorphosis,' 1891, and part ii. 'Organization and Growth,' 1892; 'Studies in General Physiology,' 1905; 'The Dynamics of Living Matters,' 1906; 'Investigations on Artificial Parthenogenesis' in the same year; 'The Mechanistic Conception of Life,' 1912; 'Artificial Parthenogenesis and Fertilization,' 1913; 'The Organism as a Whole,' 1916; 'Forced Movements, Tropisms, and Animal Conduct,' 1918; and 'Proteins,' 1922. Since 1910 he was a Member of the Rockefeller Institute for Medical Research, New York, and was honorary member of numerous scientific bodies in Europe and North America. [B. D. J.]

CARL FREDRIK OTTO NORDSTEDT was born in Jönköping the 20th January, 1838, and died in Lund at the age of 86 on the

6th February, 1924. His ancestors were Carl Peter Ulrik Nordstedt and Beata Sophia Palmstjerna. By his grandfather he came from Samuel Linnæus, the only brother of Carl von Linné, our eponymous hero, his grandmother being Ulrica Charlotta Linnæus, born of the large family which was bred at Stenbrohult in Småland.

Our late Foreign Member spent his childhood in his native town, and from 1846 to 1856 he passed through the high school of Jönköping. In the last year he went up on the 13th September to Lund, the southern university of Sweden, and came under the fascinating influence of Jakob Georg Agardh, the famous algologist, though the taste for botany was derived from his own father, who had in 1826 put forward, under the presidency of Carl Peter Thunberg the successor of the younger Carl von Linné at Uppsala, a disputation 'De Bardana.' Meanwhile Otto Nordstedt's studies were concentrated upon a medical career, and in the beginning of 1861 he passed his "Candidat" examination, and for six months of 1862-63 he served as junior physician in the military hospital at Stockholm. After this employment his burning love for scientific botany burst forth. The young energetic Fredrik Areschoug had then been for some years the adjunct in botany and demonstrator, and with a staff of young naturalists had devoted himself to this study. The impression caused by intimate association with many of these comrades, soon drove out the tendency to medical studies from his mind, and he settled down for the rest of his life, which a moderate income permitted him to pursue, without regard to his livelihood. During his early student days Nordstedt had become a leading spirit amongst the younger botanists, and also with a similar aged comrade, Lars Johan Wahlstedt, with whom he lived many years, was born the thought of starting a club for botany in the University. The plan ripened in March 1858, and then was founded, with 36 botanists with Areschoug at the head, the society, Lund Botanical Club, the first founded in Sweden, and still flourishing. Nordstedt devoted time, interest, and labour in its behalf, early taking up the study of the freshwater algæ, in which he became world famous. Always fond of an open-air life, he regularly spent his summer at his father's home at Grimstorp, West Gothland, in excursions for the local flora and preliminary studies for his algological investigations, and the ample material thus got together was liberally shared with Wahlstedt and others.

As the years passed, articles flowed from Nordstedt's pen, some of which were translated into other languages. He might have been suspected of working for an academic position, but he always cast a veil of secrecy over his intentions. But the designed post of Docent by his old professor, Agardh, did not occur; he remained a free-lance, passing his time in scientific work; thus, he served as Amanuensis in the Botanic Institute from 1873 to 1875, and three years later, at the end of 1878, he accepted the post as

a permanency. His sense of order and precision, with his punctuality, were appreciated, and he retained that position for more than 40 years.

At the end of 1870 a conservatorship was set up in the same institution, following the gift of 40,000 phanerogams by Prof. C. Agardh, and Nordstedt became the first holder, till 1909, when he retired upon a pension. Six years earlier, in 1903, he had received the appellation of Professor from the King, whilst as early as 1881 he had received the honorary degree of Ph.D. from Lund University.

After the death of Prof. J. G. Agardh in January 1901, his rich library came by bequest to the Botanical Institution, and Nordstedt became its first Librarian; only four days before his death he was in his accustomed place, which he had filled gratuitously for 22 years.

Nordstedt's great importance to Swedish botany is shown chiefly by his editing the 'Botaniska Notiser' for the long period of fifty-two years. The oldest Swedish botanical journal, it was established by the elder Fries before the 'Botanische Zeitung' of 1843, and enjoyed a series of editors with varying success, until Alfred Falk and Nordstedt entertained the idea of energetically pushing it forward in the year 1870, and the first number of the resuscitated journal appeared in January 1871, and one day after Falk died of consumption. Nordstedt was thus left alone to bear the burden, which he bore for 51 years; after 1921 the journal was taken over by the Lund Botanic Club under new conditions.

Nordstedt's scientific contributions, apart from his constant share in the pages of his 'Botaniska Notiser,' were not numerous, but were important. The only Swede whom J. G. Agardh trained as an algologist, he devoted himself, as we have noted above, to forward the study of freshwater algae, and in this he was eminently successful. He completed a fragment of a Monograph of Characeæ of Alexander Braun in the 'Berlin Abhandlungen' of 211 pages and 7 plates in 1882, but his most extensive work was his 'Index Desmidiacearum,' published in Berlin in 1896, of 310 pages; and the present writer had the pleasure of supplying material for a Supplement of 149 pages in 1908.

He was created Knight of the Vasa Order in 1900 and of the Polar Star in 1906; he became member of the Swedish Academy of Sciences in 1887, and of many other societies; amongst them he was elected a Foreign Member of the Linnean Society on the 2nd May, 1895. [B. D. J.]

The Hon. NATHANIEL CHARLES ROTHSCHILD, younger son of the first Baron Rothschild, in a fit of temporary mental depression committed suicide at his residence, Ashton Wold, Oundle, on the 12th October, 1923. He was born on the 9th May, 1877, and became a partner in N. M. Rothschild & Sons, merchants, of New Court, St. Swithin's Lane. From his early years he was

attracted to entomology, and on the 16th February, 1899, he was elected a Fellow of the Linnean Society. He amassed valuable collections of insects, some of which he gave during life to the British Museum (Natural History). During the autumn of last year his health suffered; he spoke of hearing voices, and had been medically treated in London before the end was reached.

He left by will to the National Trust his sporting rights over Tring reservoirs, and Anglesey Fen, near Woodwalton, Huntingdonshire, 232 acres near it, and £3000. To the British Museum £10,000, to apply the income for the salary of a proper custodian to look after the collection of Siphonaptera or other parasitic insects which he had already given to the Museum. To that institution he also left his drawings of British butterflies, and his living orchids to the Royal Botanic Gardens, Kew. [B. D. J.]

HEIDER auf FRANZ EILHARD SCHULZE, who died at Berlin on the 29th October, 1921, in his 81st year, came of a learned family. He was born at Eldena bei Greifswald on the 22nd March, 1840, the son of Prof. Franz Ferdinand Schulze, of Rostock University. At an early age he took up the study of medicine, diverging later towards comparative anatomy, which occupied his attention whilst he worked as Extraordinary Professor of Anatomy and later as Ordinary Professor of Zoology, both of them in Rostock, and then specially studied Metazoa and the development of Medusa-buds.

In 1872 Schulze served as zoologist on board the 'Pomerania' expedition in the North Sea; he afterwards worked up the collected Protozoa and Cœlenterates. Sponges took up much of his attention; as the lowest division of the Cœlenterates, he reported upon the Hexactinellida of the 'Challenger,' Report No. xxi.; upon the same group from the Indian Ocean, the Mediterranean, the Red Sea, of the 'Valdivia' in 1905; and with R. Kirkpatrick, the above-mentioned group from the German Polar Expedition in 1910.

He was an admirable administrator; he set up zoological institutes where his sphere of labour lay—Rostock, Graz, and Berlin, the last being a specially successful one. In 1894 he was appointed general director of the "Tierreichs." The latest work to which he set his hand was the 'Nomenclator animalium generum et subgenerum,' still unfinished, unhappily, though the manuscript is practically ready for the printer.

Professor F. E. Schulze was elected Foreign Member of the Linnean Society on the 1st May, 1902. He left a very numerous band of former students to cherish his memory and to spread his reputation. [B. D. J.]

Colonel CHARLES SWINHOE, widely known as a distinguished entomologist, was born on the 29th August, 1836, a member of a family notable for more than one zoologist. He entered the Army when eighteen as an ensign in the 56th Regiment. Soon

after the Indian Mutiny, he was dispatched to India and gazetted to the Bombay Staff Corps, in which he served for thirty years, and accompanied Sir Frederick Roberts in his historic march to Kandahar. He became an enthusiastic student of the rich and varied Indian Lepidoptera, and formed one of the largest collections ever gathered; he also studied Indian birds. With Mr. E. C. Cotes, of the Indian Museum, he drew up the first great 'Catalogue of the Moths of India,' Calcutta, 1887-89, and helped to compile the 'Lepidoptera Indica,' which he completed after the death of Dr. Frederic Moore.

Returning to England, Col. Swinhoe settled at first at Oxford in 1891, and then in 1902 removed to London. His 'Catalogue of Eastern and Australian Lepidoptera-Heterocera in the Oxford University Museum' came out in two volumes in 1892 and 1901, followed by the bestowal of an honorary M.A. by the University. He joined the Linnean Society in 1881, and was a Councillor during 1902-04, but a paralytic stroke in August 1903 brought his active career to an end in his eighty-seventh year, on the 2nd December last, at West Kensington. [B. D. J.]

Our Foreign Member since 3rd May, 1888, Emeritus Prof. JOHANNES EUGENIUS BÜLOW WARMING, widely known and held in affectionate remembrance by a wide circle of friends, died at Copenhagen on the 2nd April last, at the ripe age of 82.

He was born on November 3rd, 1841, at Manö, near the Schleswig-Holstein frontier, and spent his early life in Denmark.

Three years of investigation at Lagoa Santa, in Brazil, gave rise to many observations, which led to the emission of his views on what has since received the name of Ecology. Nearly thirty years later, in 1884, he journeyed to Greenland, and many of the recent papers in 'Grönlands Meddelelser' are from the pen of Warming or his pupils, including monographs on the life-history of many associations and Arctic plants, as the Heaths, Saxifrages, Primulaceæ, and Caryophyllaceæ. He also edited in English 'The Botany of the Faroes.' The underground wintering of perennials was little regarded until reduced to system by Warming. His introductory volume, translated into English as 'Systematic Botany' in 1895, is still a valuable text-book; other works on the sand-plants and holophytes are classics.

In 1895 there appeared an account of his lectures to his pupils, as 'Plantensamfund,' which came out the following year in a German version 'Lehrbuch der ökologischen Pflanzengeographie,' which, thirteen years later, fully revised by the author, appeared as the English text-book, 'Ecology of Plants,' 1909.

A few years later the influence of Warming resulted in the establishment of the British Ecological Society, with its organ, the 'Journal of Ecology.'

He retired from his professorial chair in 1911, at the age of 70, after a service of twenty-six years, succeeded by others who had

been trained by him, C. Raunkiær, and C. H. Ostenfeld. In 1908 he was present as a delegate at the Darwin-Wallace celebration of the Linnean Society, and met for the first time the translator of his 'Systematic Botany.' All who came into contact with his charming personality will gladly look back with pleasure to their acquaintance with so distinguished and animating a character.

[B. D. J.]

ARNOLD THOMAS WATSON, who was born in 1847, practised as a solicitor in Sheffield, and with this acted as an officer or assay-master in the mint of the same city. For the last thirty-five years the whole of his leisure was devoted to the study of the tube-building Annelids, and on this point he was an acknowledged authority.

The late Sir William Herdman was kind enough to record in the following narrative some of his recollections of our late Fellow. He says :—

"Mr. Arnold T. Watson was for many years a member of the Liverpool Marine Biological Committee, and took part enthusiastically in our early dredging expeditions in Mersey tug-boats and Salvage Association steamers. We were a band of specialists in those days, each man looking after his own group of animals and reporting on them, and Watson took charge of the Polychæt worms and especially the tubicolous forms. He was indefatigable in exploring the dredge contents when dumped out on deck, and in sifting masses of mud, sand, and shells in his search for the smaller and rarer Annelids, and many of his results appear both in our own (Liverpool) publications and elsewhere. He was most successful in keeping his marine worms alive for long periods in small aquaria, both at the Port Erin Biological Station and also at his own home in Sheffield, while he studied their habits and made careful drawings of their movements and methods of tube-building. I remember an occasion at Port Erin, in August 1894, which may be taken as characteristic of his enthusiasm and patience—rewarded in the end by a most interesting series of observations and discoveries. We had been dredging in the deep channel (60 to 70 fathoms) between the Isle of Man and Ireland, and had captured a number of specimens of the curious and rare Polynoid worm *Panthalis oerstedii*, Kinberg, which interested Watson greatly, both on account of its structure and also because of the relatively enormous tube it constructs from felted fibres and entangled mud. Some he preserved for anatomical and microscopical work, but others he carefully tended during the expedition and brought ashore alive, and then established them in small aquaria at the Biological Station in such a position against the glass that he was able with a lens to watch their tube-building habits—and there we left him, his eye glued to the glass and his pencil held ready on the paper, when we went up to the hotel for dinner. I believe we sent him some food, and we visited him during the evening,

but what I remember vividly is the following morning. He did not appear for breakfast, and on going to the laboratory about 10 o'clock there we found him at his post, in a most uncomfortable position crouched on the damp stone floor so as to be level with the base of the aquarium, and with his untouched breakfast cold and neglected on a chair behind him, where it had been placed two hours before. We tried to relieve and comfort him, but he only implored us to go away quietly—"The worm had just resumed work, and the slightest vibration might disturb it."

"The drawings and notes made on that occasion and on a second expedition later in the same year gave rise to his important paper, 'Observations on the Tube-forming Habits of *Panthalis orstedii*,' read before the Biological Society of Liverpool in January 1895, and published in vol. iv. of 'The Fauna of Liverpool Bay.' Many of his series of careful observations on tube-building Annelids were brought year by year before Section D of the British Association and other scientific meetings, and have been published by our own and other societies.

"Mr. Watson had undertaken to write one of the L. M. B. C. memoirs, and hesitated for some years as to whether *Sabellaria* or *Pectinaria*, on both of which he had made a considerable number of observations, would be the most useful type of a Tubicolous Polychæt for laboratory purposes. His friend Professor Pierre Fauvel, of Angers, has kindly undertaken to look over and arrange the mass of notes and drawings left in regard to both these worms, with the view of deciding whether one or other can be put into a sufficiently complete state for publication as a memoir."

[May 18th, 1924.] [W. A. Herdman.]

Other friends were Prof. W. C. McIntosh, Prof. Fauvel of Angers, and Prof. Gilson of Louvain, and with them he maintained a constant correspondence. Only one memoir of his was printed in our Zoological Journal, vol. xxviii. (1901) pp. 230-260, pls. 23-25, "On the Structure and Habits of the Polychæta of the Family Ammonocharidae." He was elected a Fellow of the Linnean Society on the 17th June, 1897, and was admitted on the 20th December, 1900, on the evening when he read his paper just mentioned. He died early in April of the present year, leaving behind the reputation of an unassuming, genial, and sincere character. [B. D. J.]

SIR NICOLAS YERMOLOFF.—By the lamented death in January last of the late Lieut.-General Sir Nicolas Yermoloff, K.C.B., K.C.V.O., Fellow of the Linnean Society since 21st November, 1918, and also of the Royal Microscopical Society, the science of Diatomology has lost one of its most competent and devoted students. Born in 1853 of a well-known Russian family, he was educated in Petrograd, graduating in arts at the University there, and later becoming Professor of Mathematics at the Russian Military Academy.

On entering upon his military career, Sir Nicolas soon distinguished himself in diplomacy, and was appointed to the staff of the Imperial Russian Embassy in London, where he ultimately became Military Attaché, an office which he held for over 25 years. As a result of his ability and perfect knowledge of those with whom his duties brought him into contact, he was finally appointed Chief of all the Military Attachés at the Russian War Ministry in Petrograd, which post, after he had held it for a short time, he prayed to be relieved of, which request was granted, in order that he might return to his important work in London.

In 1904 General Yermoloff was created by King Edward VII a K.C.V.O., and during the Great War he received from King George V the additional honour of K.C.B.

It was not until the Russian Revolution and the break-up of the Imperial Government that Sir Nicolas Yermoloff devoted himself in his enforced leisure to scientific research. His mastery of languages and great knowledge of the Continental scientific literature, together with his natural aptitude for microscopical research, rendered him especially capable in his study of the diatoms living and fossil in which he specialized. His communications to the Linnean Society, of which he was admitted a Fellow in 1918, are well known, notably his notes on "*Chaetoceros* and Allied Genera" and also his observations on some "Intermediate Forms of *Navicula* and *Cymbella*." In 1920 he contributed to the 'Geological Magazine' an exhaustive report upon "The Diatomaceous Earths of Lompoc, California." Among other reports he issued was one on the Spitzbergen diatoms for the Oxford University Expedition, and another for the Egyptian Government on material from well-borings at Abu-Sha.

An accomplished exponent of higher mathematics, Sir Nicholas sought to apply the theories of Cantor to the problems of evolution, in order to ascertain whether the processes of evolution are or have been continuous, discontinuous, or a discontinuous connexity as exemplified by the diatoms, and his published pamphlet on this subject, 'Y a-t-il continuité dans le Monde Physique,' was issued in Paris in 1923 shortly before his death.

He was a delightful companion to work with, and his courteous and charming manner endeared him to all whose pleasure and privilege it was to come into contact with him. His loss is deplored by all, and especially by those younger workers whom he was ever ready to receive and assist by his great experience, his sound judgment, and advice.

[C. TIERNEY.]

June 5th, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the Anniversary Meeting of the 22nd May, 1924, were read and confirmed.

Certificates in favour of Alister Clavering Hardy, M.A. (Oxon.), and John Clark were read a second time.

Miss Edith Isabel Grindley, Dina Nath Mahta, B.A. (Oxon.), and Victor Armsby Putterill, M.A. (Cape), were proposed as Fellows.

The PRESIDENT announced that he had appointed Dr. W. BATESON, F.R.S., Dr. G. P. BIDDER, Mr. HORACE W. MONCKTON, F.G.S., and Prof. F. E. WEISS, F.R.S., Vice-Presidents for the ensuing Session.

The PRESIDENT showed coloured drawings, by Miss Hilda Coley, of a remarkable hyacinth having purplish-blue flowers down one side of the spike and rose-pink on the other, with interspersed blossoms down the centre of the spike having one-half of the perianth blue and the other half rose-pink. The stalk has a deep, central groove throughout its length. The flower was produced from one of a few small cheap bulbs bought by a cottager in Reigate.

The President suggested that the phenomenon was an example of fasciation; the segregation of colour afforded material for further observation.

Mr. THÉODORE MONOD, of the Paris Museum, exhibited a remarkable new type of Crustacea, *Thermosbena mirabilis*, the full description of which is now in the press (in Bull. Soc. Zool. Fr.). It has been found at El Hamma (Tunisia) in a spring which supplies with hot water a Roman bath. The total blindness, absence of pigmentation, and marked negative heliotropism of *Thermosbena* show that it normally inhabits the subterranean waters, and as the heat of the spring is 120° F. the crustaceans can endure at least that temperature, and perhaps a higher one underground. Mr. Monod made a few remarks on the *Thermosbena*, whose characters are so peculiar that it cannot be received in any of the accepted Peracaridan orders, and seems a link between the Mysidacea and the Isopoda *sens. auct. vet.* (= Isopoda *sens. str.* + Tanaidacea). He stated that he wished to modify his description of the maxillula, which appears to have not one but two inner lobes.

Dr. W. T. Calman commented on the great interest of Mr. Monod's discovery. He stated that, apart from the

simplification of structure associated with the minute size of the animal and its subterranean habitat, *Thermosbena* provided in most of its characters a satisfactory link between the orders Mysidacea and Isopoda.

Mr. J. RAMSBOTTOM, Sec.L.S., gave an account of the investigations on the life-histories of yeasts of the late Karel Kruis, Professor of Fermentation Chemistry and Photography at the Technical University of Prague, and Professor Jan Šatava, his successor, published in Czecho-Slovakia in 1918. A series of lantern-slides were first shown to explain Guilliermond's theory of the gradual loss of sexual properties in yeasts, from isogamy in *Schizosaccharomyces octosporus* to parthenogenesis in *Saccharomyces cerevisiae* and parthenogamy between endospores in *Saccharomycodes Ludwigii*; also the relation between the Saccharomycetaceae and the Endomycetaceae.

Kruis and Šatava while working with "Springer," a Viennese pressed yeast, tried whether a laboratory culture could be rejuvenated by inducing endospore formation and cultivating the fungus from the ascus. The cultures resulting from the endospores, however, differed in many ways from the normal form. The cells were only about half the size and were spherical rather than elliptical; they formed thick, compact, persistent colonies in place of being loose, radiating and evanescent. Moreover, the dwarf form retained its character during several months—in certain cases for as long as three years under the most favourable cultural conditions. The most striking difference between the two forms is the fact that the dwarf form does not form endospores when placed on gypsum blocks. Similar results were obtained with other yeasts, and a clue to their explanation was found in the wine yeast "Melnik," which, owing to its method of growth, is very conveniently examined. It was seen here that the endospores either germinate directly and give rise to the dwarf form or else copulate in pairs and produce the normal form. It thus seems that there is an alternation of generations, the normal form being the vegetative stage and the dwarf form the sexual stage. A series of yeasts showed the same phenomena, and can be divided into two groups: in some the spores rarely conjugate with the result that small-celled colonies are the rule, while in others the spores or their immediate descendants frequently fuse, with resulting large-celled colonies. The speaker pointed out the similarity between these two types and the homothallic and heterothallic forms now known in every group of fungi. Kruis and Šatava made a few preliminary experiments to test the presence of + and — strains with no success, but the number was much too small for anything but positive evidence, as only three dwarf cultures were tried. It was also suggested that a fruitful line of research would be to study the difference in the progeny of the endospores of a single ascus; the modes of fusion of the endospores in *Saccharo-*

mycodes Ludwigii indicated that there was probably a segregation of strains here similar to that which occurs at the formation of sporidia in the Ustilagineæ. A further point made was that it seems likely that Nadson's suggestion of the primitiveness of *Saccharomyces Ludwigii* receives considerable support as against Guilliermond's view that it is reduced. A further possibility is that the numerous "species" of *Torula*, so troublesome, particularly to medical men and to brewers, are really dwarf forms or strains of species of *Saccharomyces*. The importance of this work to the brewing industry is apparent from the fact that "Hofbrau" yeast, which is of the typical "Frohberg" type in the normal (vegetative) form, is of the "Saaz" type in the dwarf (sexual) form.

The account of the work was illustrated by a series of photomicrographs of unstained preparations taken by means of ultraviolet light. The magnification was one thousand diameters, and the photographs are probably the finest of their type in existence. The series showed "Springer" yeast, "Melnik" yeast, *Saccharomyces cerevisiæ*, *S. validus*, and *Saccharomyces Ludwigii*. The introduction of the work to this country and the loan of the slides are due to Dr. J. Peklo, a colleague of the investigators.

After the President had commented on the wonderful photographs, Mr. Paulson raised the question as to whether something could not be done to persuade Bohemian and other writers of lesser known languages to append a summary of their work in some other European language. It was lamentable that such important work as that just heard should be so many years hidden, and owe its proper dissemination more or less to chance. Lt.-Col. Tull Walsh also spoke, and the President and Mr. Ramsbottom added their agreement with Mr. Paulson's remarks.

Mr. RAMSBOTTOM, as Botanical Secretary, gave an account of a paper by Mr. G. ERDTMAN, entitled "Studies in the Micropalæontology of Post-glacial deposits in northern Scotland."

This is an account of an investigation of the pollen-grains preserved in the peat from thirty-eight localities situated in Ross-shire, the Isle of Skye, the Isle of Lewis, Sutherlandshire, and the Orkney and Shetland Islands. The method employed is that which was devised by Von Post, to whom and to Dr. C. H. Weber and Prof. Lagerheim we owe most of our knowledge respecting fossil pollen.

Mrs. Reid stated that the statistical study of pollen in the peat mosses held the best hope of arriving at a knowledge of woodland floras; also of climate since Late Glacial times; because the deposits are so widespread that they give continuous evidence over wide areas, and they are fairly continuous in time in their deposition, so that they give a consecutive history.

Mr. H. W. Monckton, Treasurer and V.-P., also spoke.

Mr. C. C. A. MONRO presented two papers on Polychæta from the 'Alert' Expeditions.

June 19th, 1924.

Dr. A. B. RENDLE, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 5th June, 1924, were read and confirmed.

Professor Francis John Lewis was admitted a Fellow.

Certificates in favour of Miss Edith Isabel Grindley, Dina Nath Mahta, B.A. (Oxon.), and Victor Armsby Putterill, M.A. (Cape), were read a second time.

Miss Doris Livingstone Mackinnon, D.Sc.: Miss Margaret Brett, M.Sc. (Lond.); Bernard Cuthbert Ellison, F.R.G.S., C.M.Z.S.; Marius Maxwell; Victor Gurner Logan van Someren, M.B.O.U.; George Forrest; Alister Clavering Hardy, M.A. (Oxon.); and John Clark, were elected Fellows.

The PRESIDENT exhibited a hybrid between *Carex remota* and *C. divulsa* sent by Mr. C. E. Salmon. This occurred near Mayfield, in Sussex, in one large clump with a quantity of *C. remota* and a little *C. divulsa*.

It differs from *C. remota* by its more scabrous stem, only one (or at most two) bracts, spikelets male at the summit, or even wholly male, and in other particulars.

C. remota hybridizes with *vulpina* and produces $\times$ *C. axillaris*, which has longer-beaked fruit than the specimens exhibited, compound spikelets, &c. It also hybridizes with *C. paniculata* and produces $\times$ *C. Boenninghausenia*—a very different plant.

C. remota $\times$ *divulsa* seems extremely uncommon and is perhaps new; Ascherson and Graebner (Fl. Mitteleurop.) mention it with some doubt.

Mr. James Groves commented on the specimen.

Mr. T. A. DYMES showed a series of lantern-slides illustrating the seed of *Orchis latifolia*.

In a previous communication (June 21st, 1923) he stated that the seeds of the British Dactylorchids fell into two groups: (1) *Maculatæ*, and (2) *Latifoliæ*.

The question of *O. latifolia* L. in Britain had to be left in abeyance because all the material that had then been examined appeared to be of hybrid or mongrel origin, and always a blend of both groups. Further research has revealed a form, agreeing in other respects with *latifolia* L., whose seeds are obviously pure. They belong to group (2) *Latifoliæ*, and are very like those of *O. prætermissa* Druce, but somewhat shorter and broader and inclined to taper and curve in the apical half. The kernel, as in the other forms, is remarkably constant, both in shape and

measurements, and it, too, is shorter and broader than in *O. prætermisssa*; the mesh is smaller.

The evidence of the seeds of these plants, which came from Winchester and Chippenham Fen, suggests that *O. latifolia* L. and *O. prætermisssa* Druce are close allies or forms of the same species.

It would also seem that some of the hybrids are hardly to be distinguished in the field from *O. latifolia* L., but that their seeds betray the strain of the *Maculatæ* by the spirals or lines of thickening on the walls of the cells of the testa.

Mr. James Groves spoke on the subject.

Prof. J. H. PRIESTLEY read a paper by Miss LORNA I. SCOTT and himself on "Leaf and stem anatomy of *Tradescantia fluminensis* Vell.," illustrated by many lantern-slides.

An animated discussion followed, by the President, Prof. F. J. Lewis, Prof. Neilson Jones, Prof. R. R. Gates, Miss A. C. Halket, Mr. R. E. Chapman, Dr. Marion Delf, and Dr. M. C. Rayner (visitor).

Prof. J. H. Priestley replied to the various questions propounded.

Mr. T. B. BLOW exhibited an extensive series of Charophyta collected by him during a recent visit to Madagascar. He stated that great interest in these plants has arisen during the past five years by reason of their affording a possible means of preventing the spread of malaria by acting as larvicides. A pioneer in this field, Dr. Caballero of Barcelona, observed that, in pools where certain species of *Chara* abounded, there was an entire absence of the larvæ of mosquitoes, whereas in pools free of *Chara* these larvæ abounded. He made a great number of observations round Barcelona, and his conclusions were confirmed by several workers, such as Monsieur Alluaud in Morocco and Dr. Vasconcelos in America. On the other hand, other workers almost completely negated these observations, notably W. C. Rooper and M. A. Barber in America. Caballero's idea was that the *Chara* produced toxic matter which spread through the water and was fatal to the mosquito larvæ.

It was judged desirable to make further experiments and observations in a tropical country where malaria abounded, and Madagascar was selected. The country covered there was not only the East coast line, where are great marshes and much water, and where malaria is rampant, but also the higher ground around the capital, Tananarivo, where the climate is much healthier, and the mountainous portions near Antsirabe, where mosquitoes scarcely exist, and lastly the district of the great Lake Alaotra, which is probably the most malarious part of Madagascar. It was noticed in connection with several species of *Chara* that, where they abounded, there were rarely any mosquito larvæ in the water. The species that seemed to keep the water quite free of mosquito

larvæ were as follows: *Chara zeylanica*, *C. gymnopitys*, *Nitella Roxburghii*, and some other species of *Nitella* probably new.

Large quantities of dried *Chara*, each consisting of a single species, were obtained in order that chemists might be able to extract the alkaloids. Sufficient time had not yet elapsed to isolate these, but it is hoped later to exhibit them and to state the results when the experiments have been completed.

The idea of the early observers was that *Chara* should be cultivated in malarious districts, but this is not thought to be practicable inasmuch as Charas are by no means easy of cultivation.

An address on the subject was given by Mr. Blow before the Academy of Madagascar and excited much interest. The President, Dr. Fontoyne, suggested that the Academy should carry out various experiments on the lines laid down.

The time occupied by Mr. Blow in Madagascar in searching for these plants was seven weeks. Some of the country explored had no roads, only tracks, over which one had to be carried in a chair on the shoulders of four men. The greatest assistance was given by the French and native officials everywhere, and by the Missionaries living in the various remote districts.

This is the first occasion on which any considerable collection of Charophyta has been made in the Island. The specimens are in course of examination. It is thought that a number will prove to be new species and endemic to Madagascar.

Mr. James Groves made some remarks as to the magnificent collection of well-preserved specimens of Charophyta (nearly 400) brought back by Mr. Blow, a representative set of which were exhibited. There had not as yet been time to make more than a cursory examination of them, but from what he had seen Mr. Groves thought there would probably be a number of new species. He commented on the proportion of types in which the fruiting whorls were enveloped in a mucous cloud, and on the apparent entire absence of dioecious species. Of the species identified, one, *Chara fragilis*, was world-wide. Three species were of wide tropical distribution, while others were characteristically Southern Asiatic.

Dr. J. R. Leeson, Lieut.-Col. J. H. Tull Walsh, and Dr. W. T. Calman took part in the discussion which followed, Mr. Blow briefly replying.

Major J. H. BARBOUR, R.A.M.C., exhibited two volumes of drawings in water-colour of Indian plants.

ABSTRACT.

A further Note on *Staurastrum Dickiei* var. *parallelum* Nordst.

By CHAS. TURNER, F.L.S.

(PLATE 3.)

[Read 3rd April, 1924.]

THE material collected in the Glynn Valley in 1921 contains specimens which show an almost complete series of the process of conjugation of this Desmid. A distinct conjugation chamber (cf. *Mougeotia*) is produced between the two Desmids which are at first close together, but are pushed apart by its development. This conjugation chamber is of a cask-like character; the Desmids are attached, one at each end of the open barrel, and the protoplasm is streaming into it from each semi-cell. It is about 35μ in diameter in the centre, but it tapers a little towards the extremities; the total length, including the attached Desmids, is about 75μ . It contains four pyrenoids, two from each Desmid, each measuring about 15μ in diameter, including the sheath, which has a slightly crenate margin and shows radiating lines. These pyrenoids persist during the maturing of the zygospore, and in some instances they are still present when germination takes place.

The chamber is smooth externally during its early stages, but indications of spines develop on the integument, whilst the structure is still open at both ends and whilst the contents of the Desmids are passing into it. The barrel assumes an almost globular outline as it approaches maturity; the extremities become covered by a thin pellicle; it becomes pear-shaped as one Desmid separates from it before the other. The pointed ends contract and round off, and the integument changes into and constitutes the exospore of the zygote, which, when mature, is provided with sharp spines, and the empty semi-cells are thrust away, though they frequently remain in the proximity for some time. The zygospore is about 35μ in diameter without the spines and $45-50\mu$ including the spines. The endospore becomes clearly visible when germination takes place, and encloses the contents of the spore during the early stages of their escape.

When this material was collected, abnormal conditions of drought prevailed: this probably accounts for the presence of resting-spores in three of the Desmids which it contains—namely, *Staurastrum Dickiei*, *Staurastrum punctulatum*, and *Cosmarium Meneghinii*,—in which they have not been previously recorded. They are formed in *S. Dickiei* by the contents of one semi-cell

passing into the other in which a smooth, rounded, integumented cell is produced; its contents are at first granular, but subsequently they become oily in more mature specimens. They are 15μ in diameter and are apparently parthenospores, but their germination has not been traced, so there is no positive proof of their nature.

EXPLANATION OF THE PLATES.

Frontispiece. H.M. The King of Sweden signing the Roll of the Linnean Society.

PLATE 1.

Fig. 1. A sheet from Clifford's Herbarium.

Fig. 2. Specimen of *Grislea secunda* Linn. from Clifford's herbarium. Note the name *Grislea* in Linnæus's hand just below the stem of the plant. *Grislea secunda* is in a later hand. The pencil note by Dryander reads "In the great herbarium under Combretum."

PLATE 2.

Fig. 3. Specimen of *Browallia americana* Linn. (*Dalea* of Miller) from Chelsea Garden.

Fig. 4. A page of a volume of Paul Hermann's Herbarium of Ceylon Plants. Below the upper specimen, *Nerium Oleander* Linn., Linnæus has written the designation of the plant and its serial number, 108, in his 'Flora Zeylanica'; the larger writing is the original label of Hermann. The two lower specimens are the type of *Aspalathus indicus* Linn. Sp. Pl. 712. Linnæus has written the designation *Genista* and the number 271, under which it appears in the 'Flora Zeylanica,' and has also added the reference to Plukenet *Lotus tenuifolius maderaspatanus* Alm. 225. t. 201. f. 2, which he cited in the Flora. Hermann's label is beneath.

PLATE 3.

Stauroastrum Dickiei var. *parallelum* Nordst.; seven stages in conjugation.

Fig. 1.



Fig. 2.



Fig. 3.

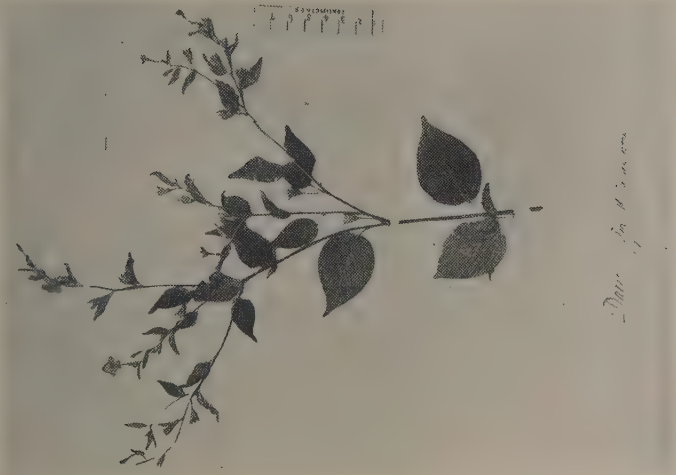
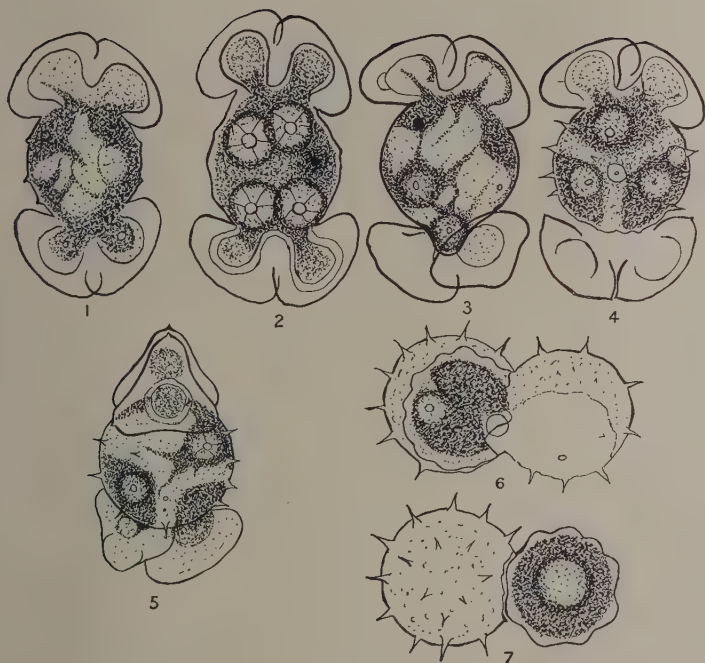


Fig. 4.





C.T. del.

Grout, photose.

STAURASTRUM DICKIEI var. **PARALLELUM** Nordst.

BENEFACTIONS.

LIST in accordance with Bye-Laws, Chap. XVII. Sect. 1, of all
*Donations of the amount or value of Twenty pounds and
upwards, received during the past Twenty years.*

1905.

Royal Society : First grant in aid of Dr. G. H. Fowler's 'Biscayan Plankton,' £50.

Executors of the late G. B. Buckton, Esq. : Contribution for colouring plates of his paper, £26.

1906.

Royal Society : Second grant towards 'Biscayan Plankton,' £50.

Subscription portrait of Prof. S. H. Vines, by Hon. John Collier.

Royal Swedish Academy of Science : Copies of portraits of C. von Linné, after Per Krafft the elder, and A. Roslin, both by Jean Haagen.

1907.

Royal University of Uppsala : Copy by Jean Haagen of portrait of C. v. Linné, by J. H. Scheffel (1739).

Royal Society : Third and final grant towards 'Biscayan Plankton,' £50.

The Trustees of the Percy Sladen Memorial Fund : First grant towards publication of Mr. Stanley Gardiner's *Researches in the Indian Ocean in H.M.S. 'Sealark,'* £200.

1908.

Prof. Gustaf Retzius : Plaster cast of bust of Carl von Linné, modelled by Walther Runeberg from the portrait by Scheffel (1739) at Linnés Hammarby : the bronze original designed for the façade of the new building for the Royal Academy of Science, Stockholm.

Miss Sarah Marianne Silver (afterwards Mrs. Sinclair), F.L.S. : Cabinet formerly belonging to Mr. S. W. Silver, F.L.S.

1909.

The Trustees of the Percy Sladen Memorial Fund : Second grant towards publication of Mr. Stanley Gardiner's *Researches in the Indian Ocean in H.M.S. 'Sealark,'* £200.

Prof. James William Helenus Trail, F.R.S., F.L.S. : Gift of £100 in Trust, to encourage Research on the Nature of Proto-plasm.

1910.

- Royal Society: Grant towards Dr. G. H. Fowler's paper on Biscayan Ostracoda, £50.
 Sir Joseph Hooker: Gold watch-chain worn by Robert Brown, and seal with portrait of Carl von Linné by Tassie.
 Prof. J. S. Gardiner: Payment in aid of illustrations, £35 0s. 6d.
 Sir Frank Crisp: Donation in Trust for Microscopical Research, £200.
 The Trustees of the Percy Sladen Memorial Fund: Third grant towards publication of Prof. Stanley Gardiner's *Researches in the Indian Ocean*, £200. (For third volume.)

1911.

- The Trustees of the Percy Sladen Memorial Fund: Second Donation towards the publication of the third volume on the *Indian Ocean Researches*, £70.
 The same: First Donation towards the fourth volume, £130.

1912.

- The Indian Government: Contribution towards the illustration of Mr. E. P. Stebbing's paper on Himalayan *Chermes*, £46 15s. 2d.
 The late Mr. Francis Tagart, £500 free of Legacy Duty.
 The late Sir Joseph Dalton Hooker, O.M., G.C.S.I., £100 free of Legacy Duty.
 The Trustees of the Percy Sladen Memorial Fund: Second Donation towards the publication of the fourth volume on the *Indian Ocean Researches*, £140.
 The same: First Donation towards the fifth volume, £60.

1913.

- Royal Society: Grant towards Dr. R. R. Gates's paper on *Mutating Oenotheras*, £60.
 Sir Frank Crisp, Bt.: Wallichian Cabinets, £50.
 The Trustees of the Percy Sladen Memorial Fund: Second Donation towards the publication of the fifth volume, £200.

1914.

- Royal Society: Grant towards Miss Gibbs's paper on the Flora of British North Borneo, £50.
 Miss Foot: Cost of illustration of her paper on *Euschistus*.
 The Trustees of the Percy Sladen Memorial Fund: Third Donation towards the fifth volume, £10.
 The same: First Donation towards the sixth volume, £190.

1915.

The Trustees of the Percy Sladen Memorial Fund : Second Donation towards the sixth volume, £80.

Miss Foot : Cost of second paper on *Euschistus*, £32 10s.

Royal Society : Donations towards the cost of a paper by Mrs. Arber, D.Sc., £40.

The same : towards paper on Utakwa River plants by Mr. H. N. Ridley, C.M.G., F.R.S., £50.

Miss Marietta Pallis : Instalment of cost of her paper on Plav, £30.

Thomas Henry Riches, Esq. : Dr. A. R. Wallace's library on Natural History.

Sir Frank Crisp, Bt. : New shelving for Wallace's Volumes.

1916.

Mr. E. Heron-Allen : Contribution to cost of paper on Foraminifera of N.W. Scotland, £44.

Messrs. H. Takeda and C. West : Contribution towards the illustration of their paper, £40.

Royal Society : Contribution towards the illustration of two papers by Prof. Dendy, £40.

The same : Contribution towards Mr. Swynnerton's paper on Form and Colouring, £70.

The High Commission for the Union of South Africa, per Dr. J. D. F. Gilchrist, for the illustration of his paper on *Jasus Lalandii*, £30.

Miss Marietta Pallis : Balance of cost of her paper on Plav, £90 16s. 6d.

Sir Frank Crisp, Bt. : Phototyped copy of Dioscorides from the 'Codex Aniciæ Julianæ' at Vienna.

1917.

British Ornithologists' Union, etc. : Contribution towards cost of Mr. H. N. Ridley's paper, £20.

The Royal Society : Second contribution towards the printing of Mr. C. F. M. Swynnerton's paper on Form and Colouring, £75.

Sir Frank Crisp, Bt. : 'Lindenia,' Ghent, 1891-1901. 17 vols. sm. fol.

1919.

Dr. B. Daydon Jackson : MS. index to Linnean Society's Journal, Botany, vols. xxi.-xl. (1884-1912) and the Botanic entries in the 'Proceedings' for the same period.

1920.

The Royal Society : Third contribution towards the printing of Mr. C. F. M. Swynnerton's paper as above, £50.

The High Commission for the Union of South Africa, for the printing of Dr. J. D. F. Gilchrist's paper on *Jasus Lalandii*, Part II., £60.

1921.

- The Percy Sladen Memorial Fund: Additional Grant in aid of publication of 'Transactions,' 2nd ser., Zoology, vol. xvii. part 4, £72 10s.
- The same: Grant in aid of publication of four papers on the Houtman Abrolhos Islands, £100.
- The Royal Society: Donation in aid of papers by Mr. N. E. Brown and Mr. S. L. Moore, £90.
- Dr. W. Rushton Parker: Donation of a large series of portraits of Naturalists and Persons after whom Genera have been named, and work on rearrangement and annotation of the entire collection.
- Prof. C. S. Sargent, F.M.L.S.: Eight volumes issued by the Arnold Arboretum, including "The Bradley Bibliography."
- Dr. B. Daydon Jackson: MS. Catalogue of each sheet in the Linnean Herbarium; bound in two volumes folio.

1922.

- The late Sir Joseph Hooker: Donation of his Medals and Decorations. (Reversion to Linnean Society on Lady Hooker's decease.)
- Anonymous donation in aid of publication of the late Dr. E. A. Newell Arber's paper, entitled "Critical Studies of Coal-Measure Plant-impressions," £60.
- The Trustees of the Percy Sladen Memorial Fund: Cost of printing Transactions, ser. II. Zool., vol. xviii. pt. 1.

1923.

- Dr. W. Rushton Parker: (1) Donation of Oxford New English Dictionary; vols. i.-ix., vol. x. in parts, 4to, 1888-1923→
(2) Encyclopædia Britannica; ed. XI. Cambridge, 1920-22. 32 vols. 4to.
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ADDITIONS AND DONATIONS

TO THE

LIBRARY.

1923-1924.

- Archiv für Zellforschung.** Bd. i.-xvii.
8vo. *Leipzig*, 1908-1923. *Dr. W. Bateson.*
- Atkinson (George Francis).** *Studies of American Fungi: Mushrooms Edible, Poisonous, etc.* 8vo. *New York*, 1911.
- Bailey (Liberty Hyde).** *Manual of Cultivated Plants.* 8vo. *New York*, 1924.
- Baltzer (Fritz).** *See Naples—Zool. Station.* Monogr. xxxiv.
- Beccari (Odoardo).** *Palme della Tribù Borasseæ. Opera postuma.* Curante UGO LINO MARTELLI. Fasc. 1→ fol. *Firenze*, 1924→
- Beebe (William).** *Galapagos: World's End.* 4to. *New York & London*, 1924. *Dr. B. Daydon Jackson.*
- Bernard (Pierre) & others.** *Le Jardin des Plantes du Muséum d'Histoire Naturelle.* 2 vols. [Vol. ii. is by LEMAOUT alone.] 4to. *Paris*, 1842-43. *The Lady Isabel Browne.*
- Bewick (Thomas).** *A History of British Birds.* 2 vols. 8vo. *Newcastle*, 1826. *H. W. Monckton.*
- Black (J. M.).** *The Naturalised Flora of South Australia.* 8vo. *Adelaide*, 1909.
- Bose (Sir Jagadis Chunder).** *The Physiology of the Ascent of Sap.* 8vo. *London*, 1923. *Miss May Rathbone.*
- Boule (Marcellin).** *Fossil Men: Elements of Human Palæontology.* Translated by J. E. RITCHIE and J. RITCHIE. 8vo. *Edinburgh*, 1923.
- Bridges (C. B.) and Morgan (T. H.).** *The Third-Chromosome Group of Mutant Characters of *Drosophila melanogaster*.* (Carnegie Inst. Publ. 327.) 8vo. *Washington*, 1923.
- Bridges (C. B.).** *See Morgan (T. H.).*
- British (The) Journal of Experimental Biology.** Vol. i→ 8vo. *Edinburgh*, 1923→
- British Museum (Natural History).**
British Antarctic ('Terra Nova') Expedition, 1910. Natural History Reports.
Botany. Part III. *Lichens.* By O. V. DARBISHIRE.
Geology. Vol. I. No. 6. *The Plutonic and Hypabyssal Rocks of South Victoria Land.* By W. CAMPBELL SMITH.

British Museum (cont.).

- Zoology. Vol. III. No. 10. Crustacea, Part VII. Mysidacea. By
W. M. TATTERSALL.
Vol. V. No. 3. Cœlenterata, Part III. Antipatharia.
By H. KNIVETT TOTTON.
Vol. VI. No. 3. Porifera, Part I. Non-Antarctic Sponges.
By ARTHUR DENDY.
Vol. VII. No. 1. Mollusca, Part V. Anatomy of Gastro-
poda. By NELLIE B. EALES.
Vol. VIII. No. 1. Crustacea, Part VIII. Euphausiacea.
By W. M. TATTERSALL.

GUIDE-BOOKS.

- A Guide to the Elephants (Recent and Fossil) exhibited in the
Department of Geology and Palæontology. 1922.
A Guide to the Fossil Mammals and Birds, Ed. 10. 1923.
Guide to the Exhibition Galleries of Geology and Palæontology.
1923.
Guide to the Mollusca exhibited in the Zoological Department.
1923.

ECONOMIC SERIES, No. 4.

- Mosquitoes and their relation to disease. By F. W. EDWARDS.
1923.
Buxton (P. A.). Animal Life in Deserts. 8vo. London, 1923.
Candolle (Alphonse de). Histoire des Sciences et des Savants
depuis deux Siècles.
8vo. Paris, 1873. Sir W. T. Thiselton-Dyer.
Candolle (Casimir de). Piperacearum Clavis analytica.
8vo. Genève, 1923. Major-General R. de Candolle.
Chamberlain (Charles J.). See Coulter (John M.).
Clements (Frederick Edward) and Long (Frances). Experimental
Pollination: an outline of the Ecology of Flowers and Insects.
(Carnegie Inst. Publ. 336.) 8vo. Washington, 1923.
Clements (Frederic E.). See Hall (Harvey M.).
Columella (Lucius Junius Moderatus). L. J. M. Columella of
Husbandry, in twelve books; and his book concerning trees.
4to. London, 1745. Sir W. T. Thiselton-Dyer.
Conn (H. W. and Harold J.). Bacteriology.
8vo. Baltimore, 1923. Dr. B. Daydon Jackson.
Cornish (Charles Joseph). Sir W. H. Flower: A Personal
Memoir. 8vo. London, 1904. Sir W. T. Thiselton-Dyer.
Coulter (John Merle) and Chamberlain (Charles Joseph).
Morphology of Gymnosperms. 8vo. Chicago, 1921.
Dallimore (William) and Jackson (Albert Bruce). A Handbook
of Coniferæ: including Ginkgoacæ.
8vo. London, 1923. A. B. Jackson.
Dehérain (P. P.). Cours de Chimie agricole professé à l'école
d'Agriculture de Grignon.
8vo. Paris, 1873. Sir W. T. Thiselton-Dyer.
Delage (Yves). La structure du Protoplasma et les théories sur
l'hérédité et les grands problèmes de la Biologie générale.
8vo. Paris, 1895. Sir W. T. Thiselton-Dyer.

- Dobbie (H. B.).** New Zealand Ferns. Svo. *Auckland* etc., 1921.
- Ellis (William).** Polynesian Researches, during a residence of nearly six years in the South Sea Islands. 2 vols.
8vo. *London*, 1829. *Sir W. T. Thiselton-Dyer.*
- Evans (Arthur Humble).** *See* **Turner (William).**
- Faune de France (contd.).** No. 5. Polychètes errantes. Par
PIERRE FAUVEL. 1923.
[No. 6.] Diptères Anthomyides. Par E.
SÉGUY. 1923.
- Fauvel (Pierre).** *See* **Faune de France.** No. 5.
- Fitzsimons (F. W.).** The Natural History of South Africa:
Birds. Vols. i. & ii. 8vo. *London*, 1923.
- Flower (Sir William Henry).** *See* **Cornish (C. J.).**
- Forrest (H. Edward).** The Fauna of Shropshire.
8vo. *Shrewsbury*, 1899. **Author.**
- Fries (Theodor Magnus).** Linnæus. *See* **Jackson (B. D.).**
- Gray (Asa).** Scientific Papers of A. G. . . ., selected by CHARLES
SPRAGUE SARGENT. 2 vols.
Boston & New York, 1889. *Sir W. T. Thiselton-Dyer.*
- Hall (Harvey M.) and Clements (Frederic E.).** The Phylo-
genetic Method in Taxonomy. (Carnegie Inst. Publ. 326.)
4to. *Washington*, 1923.
- Harvey-Gibson (Robert John).** Outlines of the History of
Botany. 8vo. *London*, 1919.
- Herdman (Sir William Abbott).** Founders of Oceanography and
their Work. 8vo. *London*, 1923.
- Hereditas.** Genetiskt Archiv. Bd. i>. 8vo. *Lund*, 1920→
- Jackson (Albert Bruce).** *See* **Dallimore, W.**
- Jackson (Benjamin Daydon).** LINNÆUS (afterwards Carl von
Linné): the story of his life, adapted from the Swedish of
THEODOR MAGNUS FRIES . . . and brought down to the present
time in the light of recent research. 8vo. *London*, 1923.
- Kampen (P. N. van).** The Amphibia of the Indo-Australian
Archipelago. 8vo. *Leiden*, 1923.
- Kofoed (Charles Atwood) and Swezy (Olive).** The Free-living
Unarmored Dinoflagellata. (Mem. Univ. California, V.).
4to. *Berkeley*, 1921.
- Leiper (Robert Thomson).** Periodicals of Medicine and the Allied
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- Long (Frances L.).** *See* **Clements (F. E.).**
- Long (Harold C.).** Plants Poisonous to Live Stock. Ed. 2,
revised. 8vo. *Cambridge*, 1924.
- Lyell (Sir Charles).** Principles of Geology. 2 vols.
8vo. *London*, 1867-8. *Sir W. T. Thiselton-Dyer.*
- Macfarlane (John Muirhead).** Fishes: the source of Petroleum.
8vo. *New York*, 1923. **Author.**
- The Evolution and Distribution of Fishes.
8vo. *New York*, 1923. **Author.**
- McGee (J. M.).** *See* **Spoehr (H. A.).**
- Martelli (Ugolino).** *See* **Beccari (Odoardo).** *Palme della Tribu
Borasseæ.*

Mason (Eleanor D.). See Metz (Charles W.).

Mattioli (Pietro Andrea). Commentarii in sex libros Pedacii Dioscoridis . . . de medica materia.

fol. *Venetis*, 1565. Sir W. T. Thiselton-Dyer.

Maxwell (Marius). Stalking Big Game with a Camera in Equatorial Africa. 4to. London, 1921. Author.

Metz (Charles W.), Moses (Mildred S.), and Mason (Eleanor D.). Genetic Studies on *Drosophila virilis*, with considerations on the Genetics of other species of *Drosophila*.

(Carnegie Inst. Publ. 328.) 8vo. Washington, 1923.

Morgan (Thomas Hunt). The Genetic and the Operative Evidence relating to Secondary Sexual Characters.

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Morgan (T. H.) and Bridges (C. B.). Sex-Linked Inheritance in *Drosophila*. 8vo. Washington, 1916.

Morgan (T. H.), Bridges (C. B.), and Sturtevant (A. H.). Contributions to the Genetics of *Drosophila melanogaster*.

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Morgan (T. H.). See Bridges (C. B.).

Morley (Claude). The Ichneumons of Great Britain. Vols. i-v. 8vo. Plymouth & London, 1903-1914.

Moses (Mildred S.). See Metz (Charles W.).

Naef (Dr. Adolf). See Naples—Zool. Station. Monogr. xxxv.

Naples.—Zoologische Station zu Neapel. Fauna und Flora des Golfes von Neapel.

Monographie XXXIV. Echiuriden, von FRITZ BALTZER. 1917.

„ XXXV. Die Cephalopoden, von Dr. ADOLF NAEF. 1921.

North (Marianne). Recollections of a happy life. Being the autobiography of M. N. . . . Edited by her sister Mrs. JOHN ADDINGTON SYMONDS. 2 vols.

8vo. London, 1892. Sir W. T. Thiselton-Dyer.

Parker (G. H.). Smell, Taste, and Allied Senses in the Vertebrates. 8vo. Philadelphia & London, 1922.

Payne (C. Harman). The History . . . of the Chrysanthemum. (Gard. Mag.) 4to. London, 1889-90. Author.

Penard (E.). Etudes sur les infusoires d'eau douce.

8vo. Genève, 1922.

Ramshottom (John). A Handbook of the larger British Fungi.

8vo. London, 1923.

Ratray (James). A Botanical Chart or Concise Introduction to the Linnean System of Botany. Glasgow [1830?]. E. Step.

Ray Society. Publications (continued).

WEST (WILLIAM and GEORGE STEPHEN). A Monograph of the British Desmidiaceæ. Vol. v. By NELLIE CARTER.

8vo. London, 1923.

Rea (Carleton). British Basidiomycetæ. 8vo. Cambridge, 1922.

Ridley (Henry Nicholas). Spices.

8vo. London, 1912. Sir W. T. Thiselton-Dyer.

Ritchie (James). See Boule (Marcellin).

- Ritchie (Jessie Elliot). *See* Boule (Marcellin).
- Savage (Spencer). The 'Hortus Floridus' of Crispian van der Pas the Younger. (Trans. Bibliogr. Soc., n.s., iv., no. 3.)
8vo. London, 1923. Author.
- Schaeffer (Asa A.). Ameboid Movement. 8vo. Princeton, 1920.
- Scott (Dukinfield Henry). Studies in Fossil Botany. Ed. 3.
Vol. ii. Spermatophyta. 8vo. London, 1923. Author.
- Extinct Plants and Problems of Evolution.
8vo. London, 1924. Author.
- Sedgwick (Adam). A Discourse on the Studies of the University of Cambridge. 8vo. London, 1850. H. W. Monckton.
- Seguy (E.). *See* Faune de France [No. 6].
- Spoehr (H. A.) and McGee (J. M.). Studies in Plant Respiration and Photosynthesis. (Carnegie Inst. Publ. 325.)
8vo. Washington, 1923.
- Stevens (F. L.). The Fungi which cause Plant Disease.
8vo. New York, 1921.
- Sturtevant (A. H.). *See* Morgan (T. H.).
- Swezy (Olive). *See* Kofoid (Charles Atwood).
- Symonds (Mrs. J. A.). *See* North (Marianne).
- Tait (William C.). The Birds of Portugal. 8vo. London, 1924.
- Trail (James William Helenus). A Memorial Volume.
8vo. Aberdeen, 1923.
- Turner (William). Turner on Birds: a short and succinct history of the principal Birds noticed by Pliny and Aristotle, first published . . . in 1544. Edited with introduction, translation, notes, and appendix by A. H. EVANS. 8vo. Cambridge, 1903.
- Vilmorin (Jacques Levêque de). L'Hérédité chez la Betterave cultivée. 8vo. Paris, 1923. Author.
- Warming (Johannes Eugenius Bülow). Biologiske Arbejder.
4to. København, 1911.
- West (William and George Stephen). *See* Ray Society.
- Wilson (Ernest Henry) and Rehder (Alfred). A Monograph of Azaleas. 8vo. Cambridge, Mass., 1921.
- Witherby (H. F.). A Practical Handbook of British Birds.
Vols. i. & ii. 8vo. London, 1920-24.
- Yermoloff (Sir Nicolas). Y a-t-il continuité dans le Monde Physique?
8vo. Paris, 1923. Author.

INDEX TO THE PROCEEDINGS.

SESSION 1923-1924.

Note.—The following are not indexed :—The name of the Chairman at each meeting ; speakers whose remarks are not reported ; and passing allusions.

- Abstract of Paper, 69.
 Accounts, 32-34.
 Additions to Library, 75.
 Alcock, Mrs. N. L., admitted, 4.
 'Alert' expedition Polychæta (Monro), 65.
 Anderson, Dr. W. J. W., elected, 20 ; proposed, 10 ; sec. reading, 12.
 Annandale, Dr. N., deceased, 30 ; obituary, 45.
 Anniversary Meeting, 29.
 Arachnida from the Rhynie Chert (Hirst), 9.
 Associates, A. S. Kennard and J. A. Wheldon, elected, 7 ; proposed, 1 ; vacancy in List announced, 1.
 Auditors elected, 26.
- Balfour, F. R. S., admitted, 29 ; elected, 27 ; proposed, 19 ; sec. reading, 22.
 Ballots, dates of, announced, 1, 10, 25.
 Bandulska, Miss H., Cuticles of some recent and fossil Fagaceæ, 22.
 Barbour, Major J. H., water-colour drawings of Indian plants, exhibited, 68.
 Barclay, W., death reported, 1 ; obituary, 46.
 Barker, Rev. Dr. J., deceased, 30.
 Barnard, Miss C., proposed, 7 ; sec. reading, 10.
 Barnett, Miss F. E., elected, 20 ; proposed, 7 ; sec. reading, 10.
 Barrington-Ward, Rev. Canon M. J., deceased, 30 ; obituary, 46.
 Bateson, Dr. W., appointed V.-P., 63 ; elected Councillor, 31.
 Bather, Dr. F. A., exhibited Arachnida from Rhynie Chert, 9 ; Binary and Binominal Nomenclature, 9.
- Battiscombe, E., elected, 7 ; proposed, 1 ; sec. reading, 4.
 Baylis, Dr. H. A., Host-distribution of parasitic Thread-worms (Nematodes), 2.
 Beer, *see* de Beer, G. R.
 Benefactions, 71.
 Bidder, Dr. G. P., appointed V.-P., 63 ; elected Councillor, 31.
 Big Game, Stalking, with a camera (Maxwell), 24-25.
 Binary and Binominal Nomenclature, 9.
 Blackwell, Miss E. M., Flora of Solomon's Pools, 4.
 Blow, T. B., exhibited a series of Charophyta coll. in Madagascar, 67.
 Botanical Secretary (Capt. J. Ramsbottom), elected, 31 ; exhibited seedlings of Orchids raised by E. Clement without fungal aid, 27.
 Brett, Miss M., elected, 66 ; proposed, 26 ; sec. reading, 27.
 British Columbia, lantern-slides of its scenery and flowers (Mrs. Henshaw), 10.
 British Plants, various, exhibited by A. J. Wilmott, 10.
 Brooks, *see* St. John-Brooks, Dr. R. T.
 Brown, Lt.-Col. E. H., elected, 27 ; proposed, 19 ; sec. reading, 22.
 Brown, Dr. R., deceased, 30.
 Bunyard, E. A., elected Councillor, 31.
 Burne, R. H., elected Auditor, 26 ; elected Councillor, 31 ; Carotid arteries in the Shark, 11.
 Byne, L. St. G., withdrawn, 30.
- Calman, Dr. W. T., elected Councillor, 31 ; exhibited remarkable ciliate Infusorian, 11.

- Cannon, Mr., on Experimental Cytology, 29.
- Carbohydrate Enzymes of certain Monocotyledons, 5.
- Carex microglochin*, Wahlenb., exhibited by Dr. G. C. Druce, 2.
- Carex remota* × *C. divulsa*, exhibited (Salmon), 66.
- Carotid arteries in the Shark (Burne), 11.
- Cash Statement received and adopted, 30; printed as audited, 32-34.
- Cavity Parenchyma and Tyloses in Ferns (Holden), 26.
- Cephalopod, abnormal, exhibited (Robson), 18.
- Chapman, R. E., Carbohydrate Enzymes of certain Monocotyledons, 5.
- Charophyta coll. in Madagascar, exhibited (Blow), 67.
- Cheeseman, T. F., thanks received for Linnean Medal, 1; deceased, 30; obituary, 47.
- Chrysanthemum*, cultivated forms (Niwa), 16.
- Clark, J., elected, 66; proposed, 30; sec. reading, 63.
- Clayton, J., withdrawn, 30.
- Cleare, L. D., elected, 7.
- Clement, E., exhibited Seedlings of Orchids raised without fungal aid, 27.
- Coley, Miss H., her coloured drawings of a remarkable Hyacinth, exhibited, 63.
- Cook, Miss A. E., admitted, 22; elected, 20; proposed, 15; sec. reading, 18.
- Councillors elected and retired, 31.
- Crustacea, a remarkable new type of, exhibited (Monod), 63.
- Cuticles of some recent and fossil Fagaceæ (Bandulka), 22.
- Cutler, D. W., see Sandon, H.
- Cytology, Experimental, some problems of (Gray), 28.
- Dakin, Prof. W. J., withdrawn, 30.
- d'Almeida, J. F., elected, 7; proposed, 1; sec. reading, 4.
- Dalziel, Dr. J. M., lecture on West African Vegetation, 19.
- Darlington, H. R., elected Auditor, 26.
- Dawson, Miss D. L., elected, 27; proposed, 19; sec. reading, 22.
- Deane, H., deceased, 30; obituary, 48-54.
- Deaths recorded, 30.
- de Beer, G. R., admitted, 18; elected, 7; proposed, 4; sec. reading, 6.
- Dixon, E., sent fasciated stem of Rose-tree, 17.
- Dollman, G., on M. Maxwell's Big Game illustrations, 25.
- Druce, Dr. G. C., exhibited *Carex microglochin*, Wahlenb., 2.
- Dwarf oaks exhibited (Rathbone), 23.
- Dwarfed trees, by Japanese methods, exhibited (Niwa), 23.
- Dymes, T. A., lantern-slides illustrating the seed of *Orchis latifolia*, 66.
- Earthworms, their relation to Soil Reaction (Salisbury), 4.
- Edwards, W. N., Cuticular struct. of the Devonian plant *Psilophyton*, 2.
- Elections reported, 30.
- Ellison, B. C., elected, 66; proposed, 26; sec. reading, 27.
- Erdtman, G., Studies in the micro-palæontology of Post-glacial deposits in northern Scotland, 65.
- Esdaile, Miss P. C., admitted, 26; elected, 20; proposed, 12; sec. reading, 15.
- Ewart, Prof. A. J., admitted, 4; on Australian earthworms, 4.
- Fagaceæ, cuticles of some recent and fossil (Bandulka), 22.
- Ferns, Cavity Parenchyma and Tyloses in (Holden), 26.
- Festuca ovina*, L., occurrence and distribution in Britain (Howarth), 26.
- Firefly, living specimens of, exhibited (Gahan), 13.
- Foreign Members, deaths reported, 15; three vacancies announced, 15; new elections, 27, 30; proposed, 20.
- Forrest, G., elected, 66; proposed, 27; sec. reading, 30.
- Forrest, H. E., elected, 7; proposed, 1; sec. reading, 4.
- Fowler, Rev. Canon W. W., deceased, 30; obituary, 54.
- Fritch, Prof. F. E., elected Councillor, 31.
- Fungus flora of British woodlands (Ramsbottom), 14.
- Gahan, Dr. C. J., exhibited living specimens of a Firefly, *Pyrophorus punctatissimus*, Blanch., 13.
- Galium Aparine* seedling, with three branches in the axil of each cotyledon, 17.
- Gardiner, F. A., withdrawn, 30.
- Garland, see Lester-Garland.
- Garside, S., on the forms of *Hypoxis stellata*, Liun. f., 2.

- General Secretary. Annual Report, 30; elected (Dr. B. D. Jackson), 31.
- Ghose, S. L., elected, 27; proposed, 19; sec. reading, 22.
- Good, R. D'O., Germination of *Hippuris vulgaris*, Linn., 7; exhibited small species of *Utricularia* from Angola, 7.
- Goodrich, Prof. E. S., Councillor retired, 31.
- Gray, J., Some problems of Experimental Cytology, 28.
- Grindley, Miss E. L., proposed, 63; sec. reading, 66.
- Groves, J., on Charophyta coll. by Mr. Blow in Madagascar, 68.
- Gunn, T. E., deceased, 30.
- Guntler, R. W. T., elected Councillor, 31.
- Güssow, H. T., elected, 7.
- Gustav V., King of Sweden, Visit to Linnean Society's Rooms, 3, 4, 37.
- Gwynne-Vaughan, Prof. Dame Helen, Councillor retired, 31; on sexuality of *Ustilago*, 13.
- Halibut, Greenland, specimen exhibited (Norman), 13.
- Halket, Miss A. C., elected Councillor, 31.
- Hardy, A. C., elected, 66; proposed, 30; sec. reading, 63.
- Harmer, Sir S. F., Councillor retired, 31.
- Haydon, W. T., deceased, 30.
- Henshaw, Mrs., showed lantern-slides of scenery and flowers of British Columbia, 10.
- Hentschel, C. C., admitted, 14; elected, 7; proposed, 1; sec. reading, 4.
- Hertwig, Prof. O., deceased, 30.
- Hill, Dr. A. W., elected Councillor, 31.
- Hirst, S., Arachnida from the Rhynie Chert, 9.
- Hitchens, Dr. A. B., removed from List, 30.
- Holden, Dr. H. S., Occurrence of Cavity Parenchyma and Tyloses in Ferns, 26.
- Holden, Dr. H. S., and Miss A. E. Chesters, Seedling anatomy of some species of *Lupinus*, 26.
- Hooper, C. H., admitted, 27; elected, 20; proposed, 6; sec. reading, 7.
- Houghton, H. E., deceased, 30.
- Howarth, F., Sexuality of *Ustilago*, 12.
- Howarth, W. O., Occurrence and distribution of *Festuca ovina*, L., in Britain, 26.
- Hudson, F. C., withdrawn, 30.
- Hypoxis stellata*, Linn. f., its forms, (S. Garside), 2.
- Imms, Dr. A. D., elected Councillor, 31.
- Indian plants, water-colour drawings of, exhibited (Barbour), 68.
- Infusorian, ciliate, exhibited (Calman), 11.
- International Phytogeographical Excursion in Switzerland (Salisbury), 20.
- Irwin-Smith, Miss V. A., admitted, 14.
- Isopod from New Zealand (H. G. Jackson), 8.
- Jackson, Dr. B. D., elected Councillor and General Secretary, 31.
- Jackson, Miss D. J., admitted, 22; elected, 7; proposed, 1; sec. reading, 4.
- Jackson, H. G., New Terrestrial Isopod from Zululand, 8.
- Jackson, Dr. W. H., obituary, 54.
- Japanese dwarf-trees exhibited (Niwa), 23.
- Javaraya, H. C., elected, 7; proposed, 1; sec. reading, 4.
- Juel, Prof. Dr. H. O., elected Foreign Member, 27; proposed, 20.
- Kennard, A. S., elected Associate, 7; proposed, 1; sec. reading, 4.
- Kerr, Dr. A. F. G., elected, 7.
- King of Sweden's Visit to the Linnean Society, 3.
- Knight, Miss M., admitted, 6.
- Kruis, K., his investigations on Yeasts, 64.
- Lacaita, C. C., Onosmas of Linnæus and Sibthorp, with a note on those of Tournefort's herbarium, 6.
- Lawson, Prof. A. A., his lecture postponed, 12.
- Lester-Garland, L. V., elected Auditor, 26; elected Councillor, 31.
- Lewis, Prof. F. J., admitted, 66.
- Librarian's Report, 31.
- Library, Additions and Donations, 75.
- Linnæus in Holland (Presidential Address), 33-43.
- Linnæus's Onosmas, 6.
- Loeb, Prof. J., deceased, 30; obit., 55.
- Lupinus*, seedling anatomy of some species of (Holden & Chesters), 26.
- MacDonald, J., admitted, 10; elected, 7; proposed, 1; sec. reading, 4.

- McIntosh, Prof. W. C., Linnean Medal presented to, 43; his reply, 44-45.
- Mackinnon, Miss D. L., elected, 66; proposed, 26; sec. reading, 27.
- Madagascar, Charophyta coll. in, exhibited (Blow), 67.
- Mahta, D. N., proposed, 63.
- Maxwell, M., elected, 66; proposed, 27; sec. reading, 30; Stalking Big Game with a Camera, 24-25.
- Medal, Linnean, presented to Prof. W. C. McIntosh, 43.
- Mennell, H. T., withdrawn, 30.
- Micropalæontology of Post-glacial deposits in northern Scotland (Erdtman), 65.
- Mitra, M., elected, 9.
- Monckton, H. W., appointed V.-P., 63; elected Councillor and Treasurer, 31; exhibited *Orthotrichum cupulatum*, Hoffm., 14.
- Monod, T., exhibited a remarkable new type of Crustacea, 63.
- Monro, C. C. A., admitted, 6; new Polychæta worm from London Docks, 8; Polychæta from the 'Alert' expeditions, 65.
- Nematodes, host-distrib. of parasitic (Baylis), 2.
- Nicholl, Rev. D. S. W., deceased, 30.
- Niwa, Prof. T., Cultivated forms of the Chrysanthemum, 16; exhibited trees dwarfed by Japanese methods, 23.
- Nordstedt, Prof. O. F. O., deceased, 30; obituary, 55-57.
- Norman, C., admitted, 29; elected, 7; proposed, 4; sec. reading, 6.
- Norman, J. R., exhibited specimen of the Greenland Halibut (*Reinhardtius hippoglossoides*), 13.
- Obituary Notices, 45-62.
- Onosmas of Linnæus and Sibthorp (Lacaita), 6.
- Orchids, seedlings of, raised without fungal aid (Clement), 27.
- Orchis latifolia*, lantern-slides illustrating the seed of (Dymes), 66.
- Orthoptera and allied insects, specimens exhibited (Waterston), 18.
- Orthotrichum cupulatum*, Hoffm., exhibited (Monckton), 14.
- Osmundaceæ, Permian, new species of (Zalessky), 6.
- Parkes, A. S., elected, 20; proposed, 6; sec. reading, 7.
- Pocock, R. I., elected Councillor, 31.
- Polychæta from the 'Alert' expeditions (Monro), 65.
- Post-glacial deposits in northern Scotland, micropalæontology of (Erdtman), 65.
- Prairie, Sir David, on *Catha edulis*, 18.
- President (Dr. A. B. Rendle), described the Visit of the King of Sweden to Linnean Society, 4; exhibited fasciated stem of Rose-tree, 17; appointed Scrutineers, 31; appointed Vice-Presidents, 63; elected, 31; Presidential Address; Linnæus in Holland, 33-43; showed coloured drawings of a remarkable Hyacinth, 63.
- Presidential Address, 35-43.
- Priestley, Prof. J. H., and Miss L. I. Scott, Leaf and stem anatomy of *Tradescantia Auminensis*, Vell., 67.
- Procter, Miss J. B., admitted, 1.
- Protozoa from soils coll. by the 'Quest' (1921-22) Expedition, 22.
- Psilophyton*, its cuticular structure (Edwards), 2.
- Pugsley, H. W., exhibited specimens of an undescribed *Statice*, 17.
- Putterill, V. A., proposed, 63.
- Pyrophorus punctatissimus*, Blanch., living specimens exhibited (Gahan), 13.
- Ramsbottom, Capt. J., elected Councillor and Botanical Secretary, 31; on fungus flora on British woodlands, 14; account of investigations on the life-histories of yeasts by Kruis and Satava, 64-65.
- Rathbone, Miss M., exhibited dwarf oaks, 23.
- Removals from List by Council, 30.
- Rendle, Dr. A. B., elected President and Councillor, 31; see also under "President."
- Ridley, H. N., elected Auditor, 26; on *Hippuris*, 8.
- Robson, G. C., exhibited an abnormal Cephalopod (*Histioteuthis bonelliana* Fér.), 18.
- Rogers, Dr. R. S., elected, 20; proposed, 10; sec. reading, 12.
- Rose-tree, fasciated stem exhibited (President), 17.
- Rothschild, Lord, Councillor retired, 31.
- Rothschild, Hon. N. C., deceased, 30; obituary, 57.
- Royal Visit to Linnean Society's rooms, 3.
- St. John-Brooks, Dr. R. T., admitted, 18; elected, 7.

- Salisbury, Dr. E. J., Councillor retired, 31; Relation of Earthworms to Soil Reaction, 4; International Phytogeographical Excursion in Switzerland, 20.
- Salmon, C. E., exhibited hybrid between *Carex remota* and *C. divulsa*, 66.
- Sandon, H., and D. W. Cutler, Protozoa from soils coll. by the 'Quest' (1921-22) Expedition, 22.
- Satava, J., his investigations on Yeasts, 64.
- Saxton, Prof. W. T., admitted, 6.
- Schmidt, Dr. J., elected Foreign Member, 27; proposed, 20.
- School Nature Study Union, congratulated, 26; thanks from, 27.
- Schulze, Prof. F. E., deceased, 30; obituary, 58.
- Scott, Miss L. L., *see* Priestley, Prof. J. H.
- Scrutineers appointed, 31.
- Secretaries elected, 31.
- Sexuality of *Ustilago* (Howarth), 12.
- Shark, Carotid arteries in the (Burne), 11.
- Sibour, Louis Blaise, Vicomte de, withdrawn, 30.
- Sibthorp's Onosmas, 6.
- Smith, *see* Irwin-Smith.
- Solomon's Pools, Flora of (Blackwell), 4.
- Someren, V. G. L. van, elected, 66; proposed, 27; *sec. reading*, 30.
- Spemann, Dr. H., elected Foreign Member, 27; proposed, 20.
- Sprague, T. A., elected Councillor; *Galium Aparine* seedling, with three branches in the axil of each cotyledon, 17.
- Statice transwalliana* exhibited (Pugsley), 17.
- Swinhoe, Col. C., deceased, 38; obituary, 58.
- Taylor, F. H., removed from List, 30.
- Taylor, H. E. I., withdrawn, 30.
- Tabor, R. J., elected Councillor, 31.
- Thermosbena mirabilis* exhibited (Monod), 63.
- Thread-worms, host-distrib. of parasitic (Baylis), 2.
- Tippett, Rev. W. C., admitted, 27.]
- Tournefort's Onosmas, 6.
- Tradescantia fluminensis*, Vell., leaf and stem anatomy (Priestley & Scott), 67.
- Treasurer, Annual Report, 30; elected, 31.
- Turner, C., further note on *Staurostrum Dickiei* var. *parallelum*, Nordst., 26; abstract, 69-70.
- Ustilago*, sexuality of (Howarth), 12.
- Utricularia* sp. from Angola, exhibited, 7.
- Utricularia vulgaris*, Linn., function of bladders in (Withycombe), 7.
- van Someren, *see* Someren.
- Vaughan, *see* Gwynne-Vaughan.
- Vice-Presidents appointed, 63.
- Ward, *see* Barrington-Ward.
- Warming, Prof. J. E. B., deceased, 30; obituary, 59.
- Waterston, Dr. J., exhibited Orthoptera and allied insects, 18.
- Watson, A. T., deceased, 30; obituary, 60.
- Weiss, Prof. F. E., appointed V.-P., 63; elected Councillor, 31.
- West African Vegetation, lecture (Dalziel), 19.
- Wheldon, J. A., elected Associate, 7; proposed, 1; *sec. reading*, 4.
- Wille, Prof. J. N. F., deceased, 30.
- Wilmott, A. J., on germination of *Hippuris*, 8; exhibited specimens of various British Plants, 10.
- Withdrawals, 30.
- Withycombe, Dr. C. L., Function of the bladders in *Utricularia vulgaris*, Linn., 7.
- Woodward, Sir Arthur S., elected Councillor, 31.
- Woolley, R. V. G., admitted, 26; elected, 20; proposed, 12; *sec. reading*, 15.
- Yeasts, account of Kruis and Satava's investigations (Ramsbottom), 64-65.
- Yermoloff, Sir N., deceased, 30; obituary, 61.
- Yoshida, Prof. Sadao, removed from List, 30.
- Zalessky, Dr. M. D., New species of Permian Osmundaceæ, 6.
- Zoological Secretary (Dr. W. T. Calman), elected, 31.

